

Archives of
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and **REHABILITATION**

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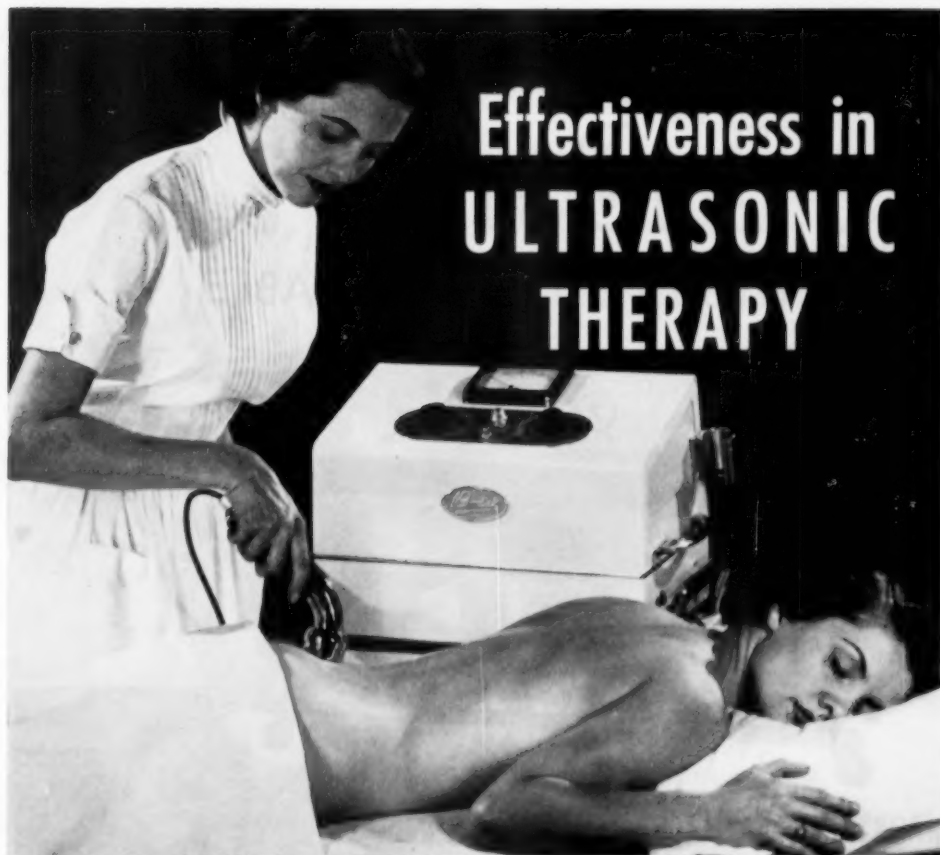
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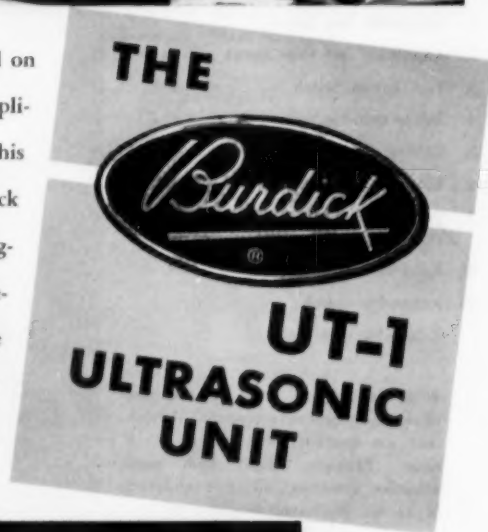
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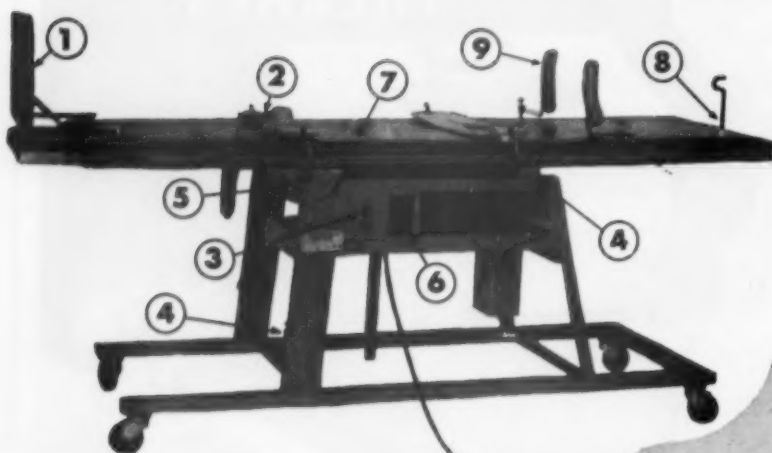
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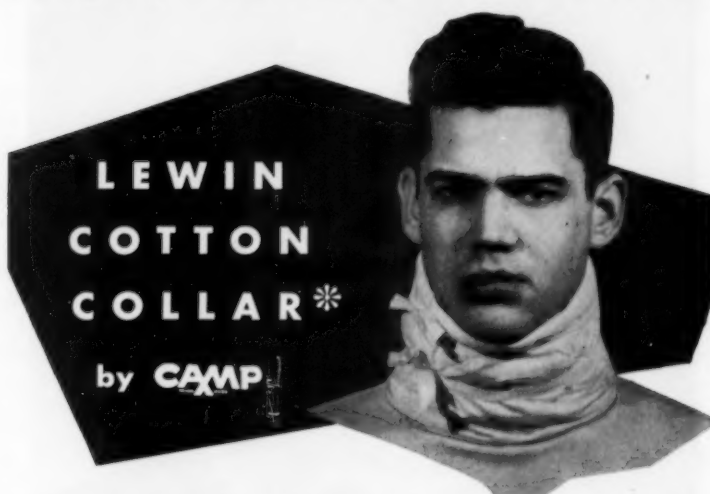
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WALTER M. SOLOMON, M.D.
1900-1954

In Memoriam

WALTER M. SOLOMON, M.D.

It is with great sadness that we record the death of our esteemed friend and colleague, Doctor Walter M. Solomon. During his distinguished medical career, his major interests and contributions were in the fields of rheumatology and of physical medicine and rehabilitation. He rendered outstanding service to the *Archives of Physical Medicine and Rehabilitation* as an editor for a number of years and more recently as Chairman of the Editorial Board.

Born in Detroit on July 26, 1900, Walter Solomon moved to Cleveland at an early age. He received his undergraduate and medical school training at Western Reserve University, and in 1934, was graduated with the degree of Doctor of Medicine. After an internship at St. Vincent's Hospital, he served for two years as a resident at Cleveland City Hospital. In 1941 he was certified by the American Board of Internal Medicine, and in 1947, he became a diplomate of the American Board of Physical Medicine and Rehabilitation. For a period of twenty years Dr. Solomon was in private practice in his specialty and was a staff member of several hospitals in Cleveland. He served on the staff of Western Reserve University as Assistant Clinical Professor of Medicine. In January 1954, Dr. Solomon joined the staff of the Cleveland Clinic in the Department of Physical Medicine and Rehabilitation. During his illness, prior to his death, he received national recognition through a Presidential Citation for his

work in rehabilitation in the State of Ohio.

During World War II, he spent four years with the 4th General Hospital (Western Reserve University Unit) in the South Pacific theater of operations. Through his efforts, the first Department of Physical Medicine and Rehabilitation was established in that area. He was elevated to the rank of Lieutenant Colonel. For outstanding service to his country, he was awarded the Bronze Star Medal.

Dr. Solomon wrote extensively and well. He authored more than thirty articles on various phases of rheumatology and physical medicine. He also contributed to Glasser's "Medical Physics," Soden's "Rehabilitation of the Handicapped," and Bierman and Licht's "Physical Medicine in General Practice."

In 1952, Dr. Solomon was elected President of the American Congress of Physical Medicine and Rehabilitation. During his term of office he furthered his outstanding record of service to this society. In 1954, he served as chairman of the Section on Physical Medicine and Rehabilitation of the American Medical Association.

Despite our bereavement, the memory of Dr. Solomon's friendliness and loyalty, his engaging sense of humor, and his untiring devotion to our specialty remains as a solace and a lasting inspiration.

Treatment of Psoriasis with Goeckerman Technic

Walter M. Solomon, M.D.*
Earl W. Netherton, M.D.
Paul A. Nelson, M.D.
and
Walter J. Zeiter, M.D.
Cleveland

Psoriasis presents a challenge to the physician because, despite careful clinical studies and scientific investigations, neither its cause nor its cure is known.

One of the most common of skin diseases, psoriasis has been estimated to comprise approximately six per cent of the cutaneous affections of patients seen in large clinics throughout the country.¹ Psoriasis was present in 0.27 per cent of a group of 20,000 young men who were examined during World War II prior to induction into the United States Army²; the frequency of this dermatosis among the inductees was second to that of only one other skin disease namely, acne vulgaris.

Although the initial lesions of psoriasis occur most commonly in patients who are between the ages of fifteen and thirty years, the disease occasionally appears for the first time in the very young or in the aged. The incidence of psoriasis is approximately the same in both men and women. In the white race, the incidence is considerably higher than among Negroes. The disease sometimes occurs in more than one member and occasionally in several generations of a family. In a study of 464 psoriatic patients,³ the incidence of the disease among siblings when neither parent had psoriasis was 2.45 per cent, while the incidence was 9.0 per cent when one parent had the disease. Mayr⁴ reported that of ten sets of identical twins and nine sets of fraternal twins, of which at least one member of each set had psoriasis, the other sibling also had the disease in seven sets of identical twins but in only one set of fraternal twins.

Although the etiology of psoriasis is unknown, certain factors are generally recognized to influence the course of the disease. One of the most important of these is sunlight. During the summer the majority of patients having psoriasis note improvement; whereas exacerbations occur most frequently in the winter months. The incidence of psoriasis has been said to be highest among natives of Iceland and lowest among those of the tropics. Other external factors that influence psoriasis are physical and chemical irritants. Investigators have produced typical psoriatic lesions by applying irritants to areas of normal skin of patients having psoriasis. Internal factors probably also influence the course of the disease. Periods of emotional stress, such as puberty, pregnancy, and the menopause, have been emphasized by some as influencing the onset of psoriasis. Various authors have claimed that endocrine dysfunction, mineral or vitamin deficiency, faulty fat metabolism, infection, and nitrogen retention have some importance in causing the disease. Such assumptions would seem to have been based more upon conjecture than scientific evidence.

The skin lesions in psoriasis usually are symmetrical and the areas of predilection are the scalp, extensor surfaces of the arms and legs, and the lower trunk. On occasion, the groin, fingernails and toenails are also involved. The most common lesion in psoriasis is a plaque, variable in size and shape, which is sharply demarcated from the surrounding normal skin. It is slightly elevated and characteristically covered with thin, silvery white, imbricated scales. When these scales are removed from new lesions, a bright-red surface is exposed.

Psoriasis usually begins as a few small papules that slowly increase in size. New

Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 8, 1954.

From the Department of Physical Medicine and Rehabilitation and Department of Dermatology (Dr. Netherton), The Cleveland Clinic Foundation and The Frank E. Buntz Educational Institute, Cleveland.

*Dr. Solomon died on December 30, 1954.

papules appear as the original lesions grow larger. In early lesions the patient may complain of pruritus and a burning sensation. The progression of the disease varies greatly among patients. It is not unusual for the original papule or plaque to remain the same size for years. In a small percentage of patients the lesions may disappear completely and then return after several years. Occasionally, a severe, generalized, exfoliative dermatitis may develop, either spontaneously or following injudicious treatment. Some patients with psoriasis experience pain, swelling and limitation of motion in certain joints. These symptoms are usually caused by superimposed rheumatoid arthritis; less often by psoriatic arthritis. All such patients present a difficult problem in management.

Since the cause of psoriasis is unknown, there has been little upon which to base a rational program of therapy. In an appreciable number of patients with psoriasis, the skin lesions may respond favorably to treatment with several different medications. In other patients, good results with treatment are more difficult to obtain; in elderly patients particularly, psoriasis frequently is resistant to therapy.

Remedies that have been employed can be divided into those given internally and those applied externally. Those that have been recommended to be given internally either by injection or oral administration include: Typhoid vaccine, whole blood, gold salts, colloidal sulfur, and colloidal manganese hydroxide; estrogenic, adrenocortical, pituitary, and thyroidal hormones; vitamins B₁ and D; and various other preparations including lipocaine, lecithin, arsenicals, iodides, salicylates and calcium. Despite enthusiastic initial reports, none of these medications has proved to be of much lasting benefit, and some have caused serious complications. More recently, cortisone and ACTH have been administered, but the results have not been promising. On occasion, marked improvement has occurred after the initial therapy with cortisone and ACTH, only to be followed by a return of the psoriatic lesions.

When these drugs are given again, results are less striking than on initial treatment.

Topical remedies in the form of reducing and keratolytic agents and irradiation with ultraviolet rays are much more effective treatment for psoriasis than are drugs given internally. The topical forms of therapy must be used carefully or a secondary exfoliative dermatitis may develop, particularly in a patient having acute psoriasis. The salves most commonly utilized are chrysarobin, ammoniated mercury, sulfur, salicylic acid, resorcin, and the tars. Roentgen irradiation is frequently effective but it is unsuited for repeated courses of therapy that are often necessary in a recurrent disease; consequently, this procedure should seldom be used in the treatment of psoriasis.

The most satisfactory treatment for psoriasis is the combination of crude coal-tar ointment and ultraviolet irradiation, which was first described by Goeckerman in 1925⁶. This combination has become the most generally employed form of treatment and has yielded consistently good results. In 2000 patients with psoriasis seen at the Mayo Clinic and to whom therapy, as recommended by Goeckerman, was administered, O'Leary⁸ found that fifteen per cent had complete remissions, seventy per cent experienced remissions for longer than three months and fifteen per cent had recurrences of the skin lesions within three months. The advantages of the Goeckerman technic are uniform effectiveness, absence of untoward reactions, good results on successive trials, and low cost in comparison with that of other forms of treatment for psoriasis. The disadvantages are that the patient must be hospitalized during the treatment and that the crude coal-tar ointment is messy.

Why the Goeckerman technic is effective is not known. Most patients with psoriasis secure varying degrees of relief of symptoms by exposing their lesions to sunshine. Herrick and Sheard⁷ demonstrated that changes occur in thin films of crude coal tar when they are exposed to ultraviolet light that make the tar

ointment more transparent to the passage of such radiation. They postulated that a fraction of the crude coal tar, which they were not able to isolate, was chemically altered by ultraviolet radiation and that this reaction was responsible for the clinical effectiveness of the tar ointment. Other substances known to be photosensitive have been clinically investigated but none has been found to be as successful in therapy as crude coal tar. Neither the crude coal-tar ointment nor ultraviolet irradiation alone is as effective as the combination of the two.

The Goeckerman technic as now employed at the Cleveland Clinic is the application of crude coal-tar ointment which consists of 6.5 per cent crude coal tar, 7 per cent zinc oxide powder, and 25 per cent starch in a base of white petrolatum ointment. A layer about one-eighth inch in thickness of this ointment is applied with a tongue blade to psoriatic lesions. Scalp lesions necessitate application of an ointment consisting of 8 per cent ammoniated mercury and 4 per cent salicylic acid ointment in a water soluble base. Twenty-four hours later the excess tar ointment is removed with cotton pledgets or gauze which has been soaked in mineral oil. A thin film of ointment, which appears as a brown stain, is allowed to remain on the lesions. Ultraviolet irradiation using an air-cooled hot quartz mercury lamp is then begun. Generally, two supine and two prone exposures are sufficient. With the patient in supine position, an exposure is given with the lamp centered over the epigastric area; then the lamp is moved and a second exposure is given centered over the knees. With the patient in prone position, corresponding exposures are carried out in order to allow uniform irradiation of all lesions. If the psoriasis is extensive, lateral exposures to the chest may also be administered. For each exposure, one minimal erythema dose (m.e.d) is given the first day. This is increased by one m.e.d each subsequent day up to a maximum of ten m.e.d. Following the ultraviolet irradiation, which is usually given early in the forenoon, the patient takes a

warm tub bath (95-98 F.) to which oatmeal and soda may be added. After the bath, another layer of crude coal-tar ointment is applied to the psoriatic lesions and the procedure, as described, is repeated.

The aim of the treatment of psoriasis is to obtain a remission that is both complete and prolonged. Since a cure cannot be effected in most patients, it is important to explain the chronic nature of the disease to the patient to obtain his full confidence and cooperation.

General therapeutic measures are as essential to the successful treatment of psoriasis as they are to that of any other disease. Obviously, any chronic infection or other disease existing in patients having psoriasis should receive full attention. Bed rest, preferably in the hospital, is an important part of the treatment program and may help bring about rapid improvement in patients with severe exacerbations of the disease. No specific diet is known that will greatly benefit psoriasis. However, obese patients should be placed on a low-calorie reducing diet which some dermatologists believe is in itself of some value. Alcoholic beverages are sometimes restricted, since psoriatic patients occasionally note increased pruritus following ingestion of alcohol. Finally, insofar as possible, psychologic factors producing emotional stress should be controlled or eliminated, because they are believed to aggravate psoriasis in many patients.

A survey of our records indicated that sixty patients with psoriasis had received the Goeckerman treatment during the past two years. (Since the Goeckerman technic is reserved for the more severe cases in which other methods of management have failed, this number does not represent the total number of patients with psoriasis who were seen in the Department of Dermatology.) Of the sixty patients, thirty-one were males and twenty-nine were females. The average age was forty-one years with a range from eleven to seventy-four years. The durations of the disease ranged from six months to fifty years with an average duration of eleven

years. The average number of exposures to ultraviolet radiation was eleven for the group. Each of six of the patients reported that a member of his immediate family also had psoriasis. The Goeckerman technic resulted in marked improvement in the appearance of the skin in fifty-six of the sixty patients. There was no change in the remaining four patients.

Conclusions

Psoriasis is a frequently recurrent common skin disease which is resistant to treatment.

The Goeckerman technic, combining the use of crude coal-tar ointment and ultraviolet irradiation, is considered to be a safe and effective treatment.

In a series of sixty patients with psoriasis undergoing the Goeckerman treatment, the skin lesions showed marked improvement in fifty-six patients, and four remained unchanged.

For reprints, write Cleveland Clinic Foundation, 2020 E. 93rd St., Cleveland 6, Ohio.

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SUCCESS IS THE KEYNOTE

of our meeting this year! An interesting and scientific exhibit will contribute much to our success. In addition to the tremendous value of these exhibits, you have the opportunity to be considered for one of the coveted awards. Requests for applications for scientific exhibit space in connection with the 33rd annual session scheduled for August 28-September 2, 1955, Hotel Statler, Detroit, are now being received. Address all communications to the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2.

Clinical Evaluation of Low-Back Pain and Its Treatment

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Pain in the back is one of the most common presenting symptoms of disease. To some it may be surprising to learn that in a consulting practice largely devoted to the problem of differential diagnosis of pain in the back the following conditions have been presented with previous diagnoses of hysteria, neurosis, disc lesion, short-leg syndrome, back-strain, or undiagnosed; these conditions have been influenza, retro-peritoneal sarcoma, Hodgkin's disease, severe anemia, Sprue, neurosyphilis, carcinoma of the uterus, carcinoma of the lung, tuberculosis, aneurism, hemangioma, ankylosing spondylitis, and Paget's disease. This is probably an incomplete list but are the conditions which immediately come to mind.

It will be noticed that the only real pre-diagnosis which has any bearing on real pathology is a disc lesion. The others have no bearing on pathology at all and cannot be considered to be real medical diagnoses.

To prescribe treatment without first reaching a diagnosis compatible with the accepted tenets of pathology can only bring medical practice into disrepute. This unfortunately is the case too often when considering the ubiquitous problem of backache. That is why the public more and more take their problems concerning the back away from medical practitioners to those in other professions. That is why some legislatures are forcing unqualified and non-medical practitioners onto the staffs of some State Hospitals.

The revoking of hospital accredita-

tion of such hospitals is in no way answering the basic problem. The public is demanding better care of their back problems than orthodoxy is giving it. It is not their fault that their demand is being answered in an injudicious way. But as a profession, we have no right to be critical unless and until we can provide the public with something better than we do at this time.

The presenting symptom of intractable back pain—be it pain in the neck, chest or low back—demands as thorough a clinical investigation as any obscure symptom complex in any other sick person. Unless that examination includes consideration of every synovial joint in the area concerned it is incomplete and any diagnosis stands a good chance of being erroneous. It should be remembered that there are 124 synovial joints in the spine in which synovial joint pathology may develop. There are only twenty-three discs in the spine.

This paper is concerned only with the low back or more specifically the lumbar spine and sacro-iliac joints. In this region there are fourteen synovial joints (counting the articulations between the twelfth thoracic and the first lumbar vertebrae) and six discs. This numerical discrepancy alone is sufficient to suggest that it is most unlikely that a disc is responsible for symptoms in more than forty-three per cent of cases of low back pain. And still no consideration has been paid to the congenital anomalies which in themselves may give rise to symptoms; nor have simple postural causes, frank bone and joint disease, causes outside the spine and systemic diseases been considered.

It is my belief that a disc may be directly responsible for symptoms in less than one per cent of low back pain.

The fashionable disc is an untenable

Read at the Thirty-first Annual Session of the American Congress of Physical Medicine and Rehabilitation, Chicago, September 4, 1953.
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theory. A disc will only cause symptoms when it prolapses. When it does prolapse it becomes an extra-dural spinal tumor. The diagnosis should be clear and the treatment—removal or decompression by surgery—certain.

Since 1947 I have published periodically a syndrome of symptoms and signs which, in my opinion, are characteristic of a disc lesion. The list has been very slightly modified since it was first published in the New Zealand Medical Journal. In this presentation there is one unpublished observation (see *Signs*) to which my attention was drawn by Dr. C. Worster-Drought, Senior Physician to the West End Hospital for Diseases of the Nervous System, London, England, who has given me permission to publish it.

Syndrome

History: In the history given by the patient, there must be an event in memory in which the low back was subjected to a sufficiently severe strain to produce the force necessary to rupture the disc which is normally a very resilient and well protected structure. Disc degeneration may follow prolonged bed rest accompanying a severe toxic illness such as typhoid fever. In such a case the precipitating strain resulting in prolapse need not be so severe. There must sometime, in the course of the development of symptoms, be a history of pain in the back.

Signs: There must be clinical evidence of mechanical derangement of the spine. It must be remembered that synovial joint dysfunction may give rise to very similar mechanical deviations. There must be mixed neurological signs. *Wasting of the extensor brevis digitorum of one foot may be a very early sign of disc prolapse.*

X-Ray: Simple X-ray examination can never be diagnostic of a disc prolapse. A diminished disc space may be suggestive but is by no means conclusive of the condition. Vertebral body lipping indicates ligamentous re-enforcement. It is of little if any diagnostic significance and, incidentally, bears no relation to

osteoarthritis.

Laboratory: Anything which presses on or irritates the theca produces a rise in the total protein in the spinal fluid above and below the lesion. A lumbar puncture should be done and the fluid analyzed.

Epidural Injection: If a mass of fluid is injected into the epidural space the injection should be painless. If an epidural tumor is present, providing it is a fixed tumor, the patient will experience acute pain when the fluid hits it. The solutions used are 20 cc. of 2% procaine followed by 40 to 80 cc. of 2% saline. The procedure has the advantage of being therapeutic in cases of sciatic neuritis. The hypertonic solution then withdraws edema fluid from the inflamed nerve root/s and relief of symptoms may be immediate.

Myelography: This is included for completeness though my opinion is that the investigation is unnecessary. If performed, it should be done only after it is determined that surgery is necessary. It should be done shortly before surgery at which time the opaque substance should be withdrawn. I still favor the cisternal route of introduction so as to eliminate any possibility of ignoring the high discs. Localization can be quite accurate using clinical methods. Direct pressure over the spinous process of the vertebrae adjacent to an injured disc is, as a rule, especially painful.

In my opinion it is wrong to make a diagnosis of a disc lesion in the event that the majority of the foregoing features are absent.

If the disc is excluded from differential diagnosis then a better alternative must be offered. It is not only logical but practical to turn for this to the synovial joints of the spine. Synovial joints, wherever they occur in the body, behave in the same way and may be subjected to the same pathology. It is illogical to ignore these joints in the spine just because they cannot be handled clinically or visualized radiologically as easily as are the joints in the limbs.

The basis of diagnosis of synovial joint

dysfunction in the spine depends on accurate and exhaustive history taking and clinical examination. It also requires a realization that one is not examining the back but in the case of the low back—fourteen separate synovial joints. Any system of examination which fails to assess the movement and condition of each of these joints must be considered incomplete. Any diagnosis made as a result of an incomplete physical examination is likely to be erroneous. Any treatment prescribed under such circumstances is very likely to be useless.

A detailed method of clinical examination by which a symptom of low back pain may be broken down to the discovery of evidence of a single synovial joint dysfunction which may be the primary cause of symptoms is demonstrated. Of course, the examination includes consideration of neurological features, soft tissue changes, disc status and the presence of possible visceral as opposed to somatic pathology. To clinch a suspected diagnosis data available only from the laboratory, radiological department or both may be required.

Demonstration

It may seem elementary, but the first thing to be remembered is the type of major movement which occurs in different areas in the spine on voluntary movement. In forward bending the lumbar and cervical spines flatten and the thoracic spine increases its kyphotic curve.

Figures 1 and 2 clearly show in side-bending of the trunk that the lumbar spine curves while the thoracic spine remains straight. In rotation of the trunk, the thoracic spine rotates while the lumbar and cervical spines remain straight.

In figures 1 and 2 the reader is invited to compare the movement of the vertebral column respectively in the movements of side-bending and of rotation of the trunk. Each figure shows an outline of the sacrum, the line of the vertebral spinous processes and the iliac crests. In figure 1, the occipital crest is indicated. Three arrows, A-B-C, indicate respectively the approximate positions of the cervico-dorsal, the dorso-lumbar and the lumbo-sacral junctions.

At the present time we are concerned with the lumbar spine and sacro-iliac joints. It is my belief that stooping is completed by movement through the

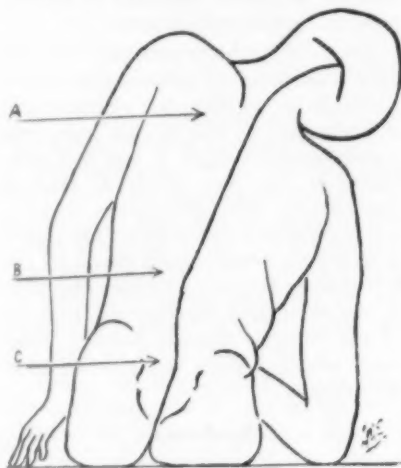


Fig. 1 — In side-bending of the trunk, the line of the spinous processes in the thoracic column A-B remains straight and parallel with the mid-dorsal line of the sacrum. The spinous processes of the lumbar column B-C and of the cervical column both form curves with their concavities open to the right. The pelvis is tilted. It is intended to show that in the movement of side-bending, contrasting with that of rotation, movement of the vertebrae takes place in the lumbar and cervical columns rather than in the thoracic column.

sacro-iliac joints. That movement does take place in them is easily demonstrated by the change in the measured distance between the posterior superior iliac spines in the sitting and prone positions. In fact, when there is no change in this measurement with the change of posture, it is a sign pathognomonic of disease in the sacro-iliac joint/s.

Similarly twisting of the trunk is completed by a backward torsion in one sacro-iliac joint and forward torsion in the other. But all these movements are composite ones of the voluntary range of movement of the spine.

The involuntary range of movement in each synovial joint in the spine is that movement which can only be obtained passively at each joint level. It is the loss of individual joint movement which causes so much local and referred back pain. The object of my examination

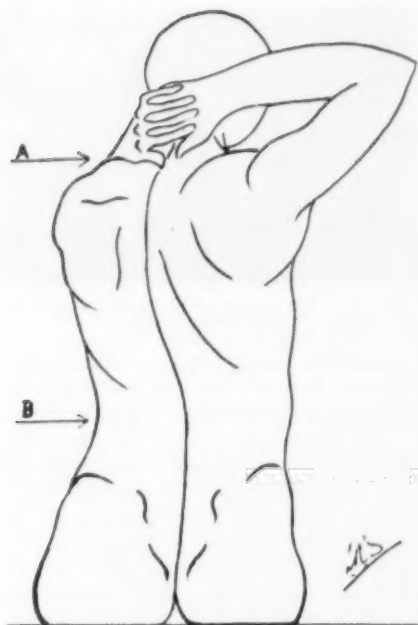


Fig. 2 — In rotation of the trunk the series of vertebral spinous processes between the arrows A-B forms a curve with its concavity open to the right. Above and below, the vertebral spinous processes preserve their vertical position except for the skull and atlas vertebrae which rotate together on the axis. It is herewith demonstrated that in rotation of the trunk, the movement takes place in the interlaminar joints of the thoracic column. There is no movement in either the lumbar or cervical column except that between the joints of the atlas and axis vertebrae.

technic is to break down the composite voluntary movement of the spine into movement of the individual synovial joint (the interlaminar and the sacroiliac joints). Loss of this movement interferes with the gross movement with which we are all acquainted in cases of backache.

First the patient is examined in a standing position. Any gross change in the normal curves is noted. The patient is then asked to indicate with one finger, if possible, the place at which he feels maximum pain. The patient's localization is frequently most accurate and revealing.

The patient is then asked to bend forward from the hips as far as possible. Any loss of intervertebral movement can be felt or seen in any one segment

of the spine. In figure 3 the spinous processes of the lumbar spine are clearly visualized and in stooping they should separate evenly as the lumbar lordosis flattens.

When slowly resuming the upright



Fig. 3 — The stooping position is assumed by the patient. The spinous processes can be clearly seen and palpated and a localized mechanical deviation from the normal often becomes more apparent. The knees must remain braced during this examination. The hands hang down in front and do not support the body weight by resting on the knees.

position, if the trunk movement is tortuous, it is often an indication that we are dealing with a disease process or muscle pathology rather than a traumatic joint problem. Inequality in muscle tone and volume in the erector spinae muscles may be noted at this time. Incidentally, the feet of the patient should be together during this standing examination.

With the patient again in the upright position the forefingers are laid over the highest points of the iliac crests and horizontally to the floor. This is a satisfactory way of demonstrating any tilt of the pelvis. The patient then sits on the couch with his legs dangling freely. The examiner stands behind him. The normal curves are checked once more. A lumbar lordosis apparently well maintained while standing will often reverse when sitting which produces a flat-back strain. From this point all movements are carried out passively by the examiner with the patient as relaxed as possible.

The patient's hands are locked behind the neck and the examining movements of upright rotation to the left and right are carried out. These movements do not often elicit signs of restriction or pain in the low back as it is clearly seen in figure 2 and figure 5 that very little spinal rotation occurs below the thoraco-lumbar junction.

The back-lying position is then adopted. The patient flops back on the examiner. It is most important for the legs to be relaxed and remain dangling. Rotation to the right and left is attempted. This throws a backward torsion strain on the sacro-iliac joint on the side to which rotation is directed. When the ischial tuberosity on the contralateral side to the direction in which the rotation is being effected leaves the couch, if the patient's trunk position is maintained and pressure is exerted over the anterior superior spine area by the examiner's hand, a backward torsion strain is exerted on the sacro-iliac joint of that side and the backward torsion strain on the other side can be relieved. Figure 6 demonstrates this maneuver. The direction of the thrust of the examiner's hand



Fig. 4 — Assessment of the relative heights of the iliac crests is illustrated.

is vertical. Finally, in this position, the distance between the posterior superior iliac spines is measured for the first time.

The patient then lies on his back. At this point a neurological examination of the legs is made and the circumference of the thighs and calves is noted at six inches above and below the patella respectively. The abdomen is also examined and the feet are noted. Insufficiency of the tendo-Achilles is a most potent cause of chronic back strain.



Fig. 5 — This illustrates the examining movement of upright rotation to the right in the sitting position. This should be compared with figure 2.

With legs again outstretched and flat, each leg is rotated inwards and outwards by rolling. These movements will differentiate between pain in either hip joint and pain referred into them.

The outstretched legs are then raised separately and together. If there is a restriction of raising one outstretched leg by pain in the back, the leg or both, the movement is stopped at the angle

at which the pain starts. If at this point dorsiflexion of the foot increases the leg pain, Lasegue's sciatic sign is said to be positive. If there is no difference in the pain or dorsiflexion of the foot, Lasegue's sign is negative. At some point in raising the outstretched leg, the tight hamstrings will pull on their insertion into the ischial tuberosity producing a rotation of the os innominatum on the sacrum through the sacro-iliac joint. This is an important differential point between sciatic nerve pain and sacro-iliac joint pain referred down the sciatic nerve.

Both outstretched legs are then raised together. In this procedure there is an equal pull on both ischial tuberosities and restriction of this movement prior to ninety degrees by pain in the low back is indicative of lumbo-sacral joint dysfunction. This restriction will usually occur at a lesser angle than when the legs are restricted and raised individually. The pain is usually relieved by flexion of the knees over the examiner's forearm which puts him in position for the next examining movement. This is side-bending of the pelvis to the right and left with the hips and knees flexed. Flexion of the hips and knees flattens and locks the lumbar spine except at the lumbo-sacral junction. Then side-bending of the pelvis to the right will open up the lumbo-sacral articulation on the left; side-bending to the left will open up the articulation on the right. Figure 7 illustrates the movement of side bending of the pelvis to the right.

The side-lying position is then adopted by the patient—first on one side, then the other. The following examining movements are carried out first on one side, then on the other.

With the patient in the *left side-lying* position, the left leg is drawn up onto the chest. The right leg is then extended with the knee bent at a right angle. When the position is attained as demonstrated in figure 8, a backward torsion strain is being put on the *left* sacro-iliac joint. Pain from the sacro-iliac joint will be relieved by release of the left leg.

If the static position is painless, but pain is experienced on release of the left leg (fig. 9), releasing the leg brings the lumbo-sacral junction into movement and such pain will indicate lumbo-sacral joint pathology.

Ober's test for a tight *right* ilio-tibial band is then performed. The test is well illustrated in figure 10. With a normal ilio-tibial band, the right knee will drop to the couch. With a tight band, the knee remains suspended in mid-air.



Fig. 6 — Examining movement of back-lying with rotation to the right in the sitting position is demonstrated. The examiner is applying a backward torsion strain on the left sacro-iliac joint which also relieves the forward torsion strain on the right sacro-iliac joint.



Fig. 7 — The movement of side-bending of the pelvis to the right which opens the inter-laminar articulations at the lumbo-sacral junction on the left is illustrated. Some vertical pressure is applied through the thighs which helps maintain the locking of the rest of the lumbar spine and controls the movement as well.

A backward strain on the patient's right sacro-iliac joint is achieved by pulling backwards over the patient's anterior superior iliac spine with the left hand and pushing forwards over the ischial tuberosity with the right hand. After the patient has been examined in the same way in the right side-lying position, he lies face downward.

The patient's legs are then reversed, with the right leg dropping in front of the lower left leg. The patient's trunk is then rotated backwards till it locks by pulling on his right shoulder with the examiner's left forearm. A down-

ward and somewhat oblique thrust is then made by the examiner with his right hand over the front of the patient's right iliac crest. This exerts a forward torsion strain on the patient's right sacro-iliac joint.

In the prone position, the first examining maneuver is that of skin rolling of the skin of the back by the fingers over the advancing thumbs. It is done first over the spine and then up each flank. Figure 12 attempts to demonstrate this procedure. It is my clinical observation that skin rolling will be tight and tender over the level of bone or



Fig. 8 — This illustration shows the static position in the left side-lying position when the left leg is fully flexed and the right leg is extended. Pain in the left low back relieved by release of the left leg (see fig. 9) is suggestive of a left sacro-iliac joint lesion. If this position is painless and on release of the left leg pain is experienced, then the lumbo-sacral junction will be suspect.



Fig. 9 — This illustration should be considered with figure 8. It shows the release of the left leg from the static position demonstrated in figure 8 and is one of the movements which differentiates between sacro-iliac joint pain and lumbo-sacral joint pain. During the release of the left leg, the right leg is not moved.



Fig. 10 — Performance of Ober's test for tightness of the ilio-tibial band on the right. It should be compared with the position adopted in figure 8. Here the left hip and knee are flexed only to ninety degrees. In figure 8 full flexion of both joints is required. The different hold by the examiner on the patient's right leg should be noted. In figure 8 the knee is supported. Here the object of the examination is to see whether the knee will drop to the table. The leg is held by the ankle.



Fig. 11 — Still in the left side-lying position, this illustrates the application of a forward torsion strain on the right sacro-iliac joint. The examiner's left forearm rotates the trunk backwards until all spinal movement is taken up. Then the forward and downward thrust by the examiner's right hand rotates the right ilium forwards on the sacrum.

joint pathology. This level can be more accurately checked by direct pressure over a vertebra by a direct vertical thrust. This should be done over each vertebra (fig. 13). The level can be further checked by adding hyper-extension before the thrust over each vertebra as illustrated in figure 14.

Tenderness to direct pressure is then sought for in the classical spots namely over the posterior sacro-iliac joint ligaments just medial to the posterior superior iliac spines and in the gluteus medius muscles just lateral to the spines; in the buttocks at the emergence of the sciatic nerve trunk and in the mid-thigh over the sciatic nerve trunk; in the ilio-tibial bands and in the erector spinae muscles.

The measurement between the pos-

terior superior iliac spines is then taken for the second time. In the absence of sacro-iliac joint disease there will be a difference between this measurement and



Fig. 12 — This illustrates the static picture of the active examining maneuver of skin rolling over the spine with the patient in the prone position. The fingers walk the thumbs up the spine at the same time rolling the skin over the thumbs.



Fig. 13 — Direct pressure is being applied over the 5th lumbar vertebra. The spinous process of each vertebra fits snugly in the V between the terminal phalanx of the examiner's thumb and the middle phalanx of his index finger. The pressure is exerted equally over each transverse process and is thus a controlled examining movement.

that taken in the sitting position of at least one-half to three-fourths inch.

The examination of the low back is not complete until a rectal examination has been performed. The lowest aspects of the anterior ligaments of the sacroiliac joints can be palpated rectally.

Conclusion

Certainly joint dysfunction anywhere gives rise to confusing secondary signs of soft-tissue change. Nowhere is this more confusing than in the low back. It is useless to prescribe therapy to alleviate secondary changes if the primary cause is overlooked.

It is inconceivable that heat, massage or electrical treatment can directly affect primary joint dysfunction. The prescription of exercises in the presence of joint dysfunction can only be expected to damage further the joint and prolong the disability.

That the prescription of heat, massage and exercises is often eventually followed by symptom alleviation does not mean that the remission of symptoms is because

of the treatment. Too often remission follows in spite of the treatment which frequently only adds to the sufferer's discomfort.

If there is clinical evidence of primary joint dysfunction then therapy should primarily be directed at restoring joint function. The logical way to restore joint function is by the use of manipulation.

The consideration of the use and abuse of manipulation is beyond the scope of this discussion. Suffice it to say that the science and art of manipulation depends upon a knowledge of the range of individual joint movement not commonly taught in the medical curriculum; an appreciation of the indications and contraindications of the therapy, and a technic which can only be learned from practice.

If manipulation is prescribed as a therapy it should be possible to predict its outcome as confidently and with as little margin of error as a good surgeon can, with confidence, predict that an operative procedure he recommends will relieve the symptoms for which it is performed.

A patient's condition should never be worse after manipulation. If it is, the manipulator not the manipulation should be blamed. Increased discomfort following any therapy means that the therapy has been wrongly or badly effected. If improvement does not immediately follow manipulation there may have been an error in clinical judgment in its prescription. A small percentage of such error is expected in any branch of medicine. But lack of improvement due to error of judgment is a very different thing to making a condition worse because of the attempted use of therapeutic technic without a good training background or complete ignorance of it.

It is not suggested that manipulation is the universal answer to the successful treatment of low backache. It is not. It is suggested that in cases in which there is primary joint dysfunction any treatment which does not include the use of manipulation to restore function can at best only be described as treatment by trial and error. This is bad medical prac-



Fig. 14 — This illustrates how the examination of direct pressure over a vertebra can be enhanced by the addition of hyper-extension. The examining thrust is through the examiner's left hand. The legs are not moved once the slack of the movement of extension at each level has been taken up. In other words, extension is achieved by the examiner lifting the legs; hyper-extension is achieved by a thrust with the examiner's left hand.

tice. Yet it would be worse practice to include manipulative therapy unless the operator has adequate training in technic which, in my opinion, takes at least six months to learn.

Manipulation has previously been presented as a subject of therapy. Here is stressed the importance of differential diagnosis or the clinical assessment of a clinical problem which unquestionably brings the practice of physical medicine into the first-stage of medicine where it belongs. The reason why there has been confusion of thought in the acceptance of this work is because the technic used in the clinical examination which has been demonstrated, forms the basis of

the therapeutic technic which may afterwards be prescribed.

The successful treatment of pain arising from joints in general, and in the spine in particular, depends on one's ability to diagnose accurately joint dysfunction (especially in the range of joint play). For instance, the successful treatment of pneumonia may depend on the prompt clinical recognition of the early signs of consolidation in a lung. Both depend equally on adequate training by good basic undergraduate teaching in clinicopathological methods of diagnosis.

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IMPORTANT ANNOUNCEMENT

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION

The next examinations for the American Board of Physical Medicine and Rehabilitation will be held in Philadelphia, June 5 and 6, 1955. The final date for filing applications is March 1, 1955. Applications for eligibility to the examinations should be mailed to the Secretary, Dr. Earl C. Elkins, 30 N. Michigan Ave., Chicago 2.

Surgery in Cerebral Palsy

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Introduction

The purposes of this paper are to discuss some of the fallacies that have grown up around the use of surgery in the treatment of cerebral palsy, and to report the benefits that can be derived from several surgical procedures frequently used in the rehabilitation of the poliomyelitis victim, but seldom used in the treatment of the cerebral palsy patient. Undoubtedly, the results from surgery in cerebral palsy are not as satisfactory nor as predictable as in poliomyelitis or other neuro-muscular diseases. However, the difficult problems encountered in rehabilitating the cerebral palsy patient can be carried out more readily following restoration of muscle balance and correction of deformities. Over-emphasis of so-called conservative therapy and wishful thinking in the use of braces and exercises, coupled with misinterpretation of statements regarding the danger of surgery have done much to hold back surgical progress in the cerebral palsy program. The widespread misunderstanding regarding the use of surgery in the treatment of the cerebral palsy patient can be attributed in part to lack of understanding of the underlying problem, poor selection of patients, or the use of ill advised procedures. Such errors occur in all branches of surgery and medicine, but they should not influence the proper use of surgery in the well selected cerebral palsy patient. At the North Carolina Cerebral Palsy Hospital, we have come to the conclusion that whenever uncontrolled spasticity or tension exists, it should be corrected insofar as possible by early and properly selected surgery.

This need holds especially true when spasticity or tension is the cause of malalignment of joints and over-stretching of the weak antigravity muscles, or is the source of over-flow to other parts.

This paper will not be limited to a detailed discussion of indications and contraindications for surgery in the cerebral palsy patient. However, it must be emphasized that a complete muscle function study should be made in each patient. The posture should be analyzed with each component evaluated as to its functions, and its over-flow action on other groups, before any type therapy, surgical or otherwise, is attempted. These studies are particularly important in those muscles with multiple actions over one or more joints. Rehabilitation of the cerebral palsy patient, as in all neuro-muscular problems, depends on the restoration of muscle balance, the proper realignment of joints, especially those concerned with weight bearing, and the establishment of a correct posture with normal relationship to the line of gravity. It goes without saying that the surgeon must have a thorough knowledge of kinesiology.

When one prepares a paper on a controversial subject, he can well expect to encounter misinterpretation, and to be cited eventually as a radical sanctioning only one method of therapy. In such instances, the profession seldom realizes or gives the author credit for realizing, that procedures described are limited in their benefits, and should be used only on the patient in whom the expectancy of good end results is within reason. In presenting this discussion on surgery in the cerebral palsy, it is hoped that such misinterpretation will not occur. Certainly the rigid rules followed regarding the purpose of surgery and its indications should dispel any such thought.

Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 9, 1954.
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Establishment of CP Unit

In 1938, a twelve bed Cerebral Palsy Unit was established at Duke University. This unit, in which treatment was conservative in nature with little or no surgery, functioned for a period of seven years until the scarcity and high cost of personnel during World War II made it advisable to suspend the work temporarily. Later, the General Assembly of North Carolina established the North Carolina Cerebral Palsy Hospital. Its first patient was admitted on February 20, 1950. Since that time, 977 patients have been examined at the hospital. In addition, an uncalculated number of cerebral palsy patients have been examined in outlying state clinics. During approximately the first two years that the Cerebral Palsy Hospital functioned, a total of seventy-two operations was performed on thirty-five patients. Since that time, there has been a gradual increase in the percentage of patients operated. Of the 977 patients examined, 164 have had one or more surgical procedures. These 164 patients represent 16.7 per cent of the patients examined. These figures should illustrate, if not prove, that the program has not been a radical one, but one wherein the benefits of surgery have been recognized and used when indicated. The attitude now is first to relieve the patients of their disabling spasticity or tension, and deformities, then to institute the training program. This change in attitude has come about as we have observed the benefits that can be derived from a well planned surgical program followed by physical restoration training. In addition to the 164 patients from the hospital who have had surgery, 22 additional patients from the Duke Hospital outpatient clinic, or from the outlying state clinics have had surgery. These 22 patients are included in table 1. As experience has been gained, it appears that surgical correction should be carried out early and preferably before the child forms bad locomotion habits. A rational approach to the problem is needed. We must remember that the central nervous system lesions that are the cause of the

paralysis are irreparable lesions. It is recognized that with corrective splints, braces, and other measures, some progress can be made in training these people. In reality however, the basic lesions remain and much of the benefits that have been attributed to long, drawn-out expensive treatment would have in many instances, come through the natural process of development as we have seen occur in patients who have never had therapy.

Muscle Analysis

In a paper¹ on the triceps surae syndrome in the cerebral palsy patient, it was pointed out that once it is determined that an over-active muscle is in need of correction, a complete appraisal must be made of that muscle, and of its antagonist before deciding as to the method of correction. This decision is especially important if the muscle is one of multiple actions that influence more than one joint, such as the triceps surae, the tensor fascia lata, the hamstrings, and many others. If surgery is to be done in this type muscle, the component parts of the muscle, and the intrinsic action of each must be thoroughly analyzed. The aim of surgery may be directed at one, or a combination of any or all of the following: (1) decrease in spasticity; (2) elimination of clonus; (3) restoration of proper function of the muscle; (4) restoration of anatomical length; (5) decrease or control of over-flow to the muscle; (6) decrease of over-flow from the muscle; (7) correction of joint alignment; (8) restoration of joint function; (9) restoration of normal posture; (10) release of tension, and (11) control of involuntary motions resulting from over-flow. An analysis of table 1 will show that surgery has been directed at correction of muscle imbalance, realignment of weight bearing joints, and restoration of normal posture.

To illustrate a complex problem in the severe cerebral palsy patient in which surgery is indicated, one can take the non-ambulatory patient who presents an equinus deformity at the ankle with

Table 1: Types of Operations

<i>Neurectomies</i>	158
Obturator (anterior branch)	116
Gastrocnemius	22
Soleus	15
Pronator teres	1
Popliteal	4
<i>Tenotomies</i>	279
Adductors	120
Achilles	43
Hamstrings	42
Iliotibial band	12
Gastrocnemius fascia	55
Posterior tibial	2
Gluteus minimus	1
Hand (intrinsic)	1
Biceps humeri	1
Plantar fascia	2
<i>Muscle origin releases</i>	66
Gastrocnemius	54
Tensor fascia lata	5
Hip flexors	7
<i>Tendon transplants</i>	45
Hand	12
Anterior tibial	7
Pronator teres	12
Patella	6
Tensor fascia lata	2
Extensor hallucis longus ..	3
Peroneus longus	3
<i>Arthrodases</i>	27
Wrist	10
Subastragalar	10
Miller procedure	3
MP joint (hand)	4
<i>Sinus tarsi blocks</i>	8
<i>Osteotomies</i>	5
Femur	3
Tibia	2
<i>Pedunculotomies</i>	2
TOTAL OPERATIONS	590

The statistics in table 1 are the actual number of procedures performed. When a procedure is done bilaterally, it is counted as two operations. If two procedures are done through the same incision, such as an adductor longus lengthening and a neurectomy of the obturator nerve, they are counted as two procedures. Each tendon transplant in the hand is counted as a procedure, although many of them are done at the same sitting. In a total of 186 patients, 590 procedures were carried out: 164 of the patients were from the North Carolina Cerebral Palsy Hospital, and 22 patients were from Duke Hospital or other sources.

valgus of the forefoot, eversion of the os calcis, and a broken down longitudinal arch. Associated with these changes is a flexion deformity of the knee, either resulting from a tight or spastic gastrocne-

mius, hamstrings, or a combination of the two. These factors, mingled with a spastic quadriceps, result in a stretching of the patellar tendon. There is an adduction deformity frequently associated with flexion internal rotation at the hip with resultant anterior tilting of the pelvis, lumbar lordosis, and weak, stretched-out abdominal and gluteal muscles. In some patients, each of these deformities may be an entity within itself; however, as in the patient with scoliosis any one or more of the deformities may be primary in nature with one or more of the others compensatory, or they may be the result of over-flow. Far too many of these children are seen after the combination of the stated forces have caused fixed deformities, permanent contractures, and bone and joint damage. In planning surgical relief in such a patient, the component thought to be the most primary should be first to be corrected. The various procedures available for correcting triceps surae involvement have been covered in the previously mentioned paper⁷. As stated in that report, we are inclined to do fewer and fewer neurectomies. If lengthening is indicated in the calf group, the surgery is limited to a lengthening of the fascia of the gastrocnemius portion of the musculotendinous junction with the soleus fibers dissected from the origin of the tendon. This operation is a modification of the procedure described by Vulpius⁸. This technic allows a lengthening with the soleus detached from the distal portion of the fascia, thus eliminating stretch reflex and in many instances clonus, without disturbing the tendon or its sheath. The foot deformity seen in such a patient has resulted in most instances from an actual or functional shortening of the triceps surae. The valgus foot deformity may be the result of spastic or tense peroneals, usually associated with a non-functioning tibialis anticus muscle and a stretching out of the tibialis posticus tendon. In this combination of deformities, the tendon of the peroneus longus is transplanted to the tibialis posticus with the distal stump of the peroneus longus being sutured into the tendon

of the peroneus brevis. These transplants, combined with a triceps surae lengthening, can produce a balanced foot.

If the eversion of the os calcis has been present sufficiently long to bring about structural changes, gratifying results have been seen following talocalcaneal stabilization either by a modified Chamber's⁸ technic wherein talocalcaneal fusion is developed across the sinus tarsi, or by the double bone graft procedure as described by Grice⁹. In most instances, where either of these procedures is indicated for pes planus correction, a lengthening of the triceps surae is routinely required. If no severe structural changes have taken place, and if the peroneals are not spastic, the pes planus deformity can be corrected with the technic described by Miller⁶, in combination with a lengthening of the triceps surae. If the knee joint is involved in a primary flexion deformity, the part played by the gastrocnemius and that played by the hamstrings must be evaluated by standard tests. Surgery should be directed at correcting the deforming force. If the gastrocnemius is at fault, release of the origin of the muscle¹ from the condyles of the femur and from the posterior aspect of the capsule of the knee joint may suffice. If necessary, lengthening or tenotomy of the offending hamstrings can be done independently or in combination with the gastrocnemius release. Following such corrections, if the patellar tendon has not been over-stretched, satisfactory active extension of the joint may be possible. If active extension to 180 degrees is not possible, transplanting the insertion of the patellar tendon distally on the shaft of the tibia, as described by Chandler⁴, can restore more complete extension of the joint.

Hip Deformities

The most difficult deformities to analyze and correct are those about the hip. As pointed out by Knight⁷ in *Campbell's Operative Orthopaedics*, it is most important that the flexion internal rotation deformity be differentiated from the simple adduction flexion deformity. Pure ad-

duction deformity is relatively uncommon and is not associated with internal rotation on attempts at forcible passive abduction of the hip. In the flexion internal rotation deformity, the tensor fascia lata will play a major role. In the presence of either of these deformities, there may exist true central nervous system flaccid paralysis of the abductors and external rotators of the hip. In our experiences, flaccidity is one of the chief disabling factors in many cerebral palsy patients. However, this weakness is not necessarily central in origin. It may be due to over-stretching and long disuse, or for lack of a better term, what might be called mental alienation. It is most difficult to differentiate between true flaccid paralysis and weakness due to over-stretching and disuse. If after well directed muscle re-education it is found that the patient can bring the weak muscles into play, release of the spasticity or tension in the antagonistic group will contribute materially to the possibility of re-developing satisfactory balanced power. This possibility of re-developing power is particularly true in the younger group where fixed fascial contractures and bony deformities have not occurred. To relieve the difficulties about the hip, partial neurectomy of the obturator nerve will be necessary plus tenotomy of at least the adductor longus and gracilis. Knight⁷ has pointed out the dangers of the Durham procedure in weakening the abductors. The tensor fascia lata is the chief offender in the flexion internal rotation deformity. Several operative procedures for release or transference of the origin of the tensor fascia lata have been described. We agree with Barr⁵ that simple myotomy of the tensor fascia lata should never be performed. In doing a transplant of the origin of the tensor, we have found it ill advised to detach the lateral origin of this muscle. Instead, the anterior oblique fibers which play such a major role in the internal rotation deformity, are freed from the ilium along with the origin of the gluteus minimus; with surgery being limited to the anterior portion of the muscles, care is taken not to interfere with nerve in-

nervation or blood supply. The anterior borders of the two muscles are then threaded with multiple end-on mattress sutures with the free ends of the sutures pointing medially. These sutures are then passed laterally and upward, under the remaining portion of the tensor fascia lata, to be brought out laterally between the tensor fascia lata and the gluteus maximus through the intermuscular septum of these muscles. As the sutures are pulled through and tightened, the anterior borders of the two dissected muscles are rolled under the remaining portion of the tensor where they are fixed. This procedure does not appreciably decrease any previous power of abduction and the transplanted portions of the muscles are in line to assist in abduction. The gluteus medius is not disturbed. In long standing internal flexion deformities, there frequently occurs a contracture of the fascia lata which results in a valgus and rotation deformity at the knee. When such a deformity is present, the fascia should be released just above the knee, according to the Yount⁸ technic, with the intermuscular septum being freed from its insertion into the femur. Following these procedures, the lower extremities can be incorporated in corrective plaster casts as described by Irwin¹⁰ in a position of abduction, extension, and external rotation, where they are held from four to six weeks and wedged for correction as indicated. During convalescence, if necessary, braces with any indicated ankle, knee, hip locks, or pelvic band, can be used. If the surgery has been well chosen and muscle balance restored, the patient should eventually be brace free.

As pointed out by Phelps¹¹, many of these patients who have never walked frequently have no sense of balance, particularly in the anterior posterior planes and may need crutches for tripod support. After being in an upright position and learning to be ambulatory with crutches, a few of these patients may develop a sense of equilibrium and eventually become crutch free. One should be cautious however, in their predictions in this type patient.

On occasions, involvement of the iliopsoas muscle may be such as to make correction of flexion deformities of the hip impossible without release of this muscle from its insertion into the femur. If needed, the surgery should be carried out to allow full extension in order that the patient can be better trained to develop his gluteal and abdominal muscles which play such an important role in an upright posture. Surgical corrections as described, allow the patient to use his extremities in a more normal pattern without undue effort against insurmountable forces. Over-flow to the body, upper extremities, and face is decreased to allow for more efficient use of the over-all rehabilitation efforts.

Conclusions

The opinions and recommendations presented are based on the results from 590 operative procedures carried out in 186 patients. Of these 186 patients, 164 were selected from 977 patients seen and examined at the North Carolina Cerebral Palsy Hospital; 22 were selected from an uncalculated number of patients seen at the Duke out-patient clinic and in outlying state crippled children's clinics. With the increased opportunities offered the cerebral palsy patient as well as all disabled individuals, and with the rapid advances being made in the rehabilitation of these patients, all facilities for evaluating the need of each child should be combined. Where surgery is indicated, it should be carried out early, in order to allow the rehabilitation worker to train patients quickly and more effectively.

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Orthopedic Treatment of Coxarthroses

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Introduction

If fracture of the femoral neck may properly be termed "the unsolved fracture," then the more encompassing subject of "disabilities of the hip" may, with far greater justification, be termed not only unsolved but indeed barely understood. This applies to congenital dislocations, to Perthes' disease, and above all, to arthritis of the hip. For those interested in the treatment of orthopedic conditions certainly no more interesting or timely topic than that of the coxarthroses could be chosen. There is no topic on which a greater diversity of opinion has been expressed and no problem in the solution of which a greater mechanical ingenuity has been developed. The very multiplicity of the solutions which has been presented bespeaks the fundamental inadequacy of all. In some degree at least, it would seem that the reason for the therapeutic failures is to be sought in the natural but highly idealistic efforts at restoration or reconstruction of the normal anatomical configuration of the hip joint. Difficult as this is in the simpler joints, it is the more difficult in the hip

because of its greater anatomical complexity.

Pelvifemoral Angle

The hip is a diarthroidal joint consisting of the femoral head and acetabulum. The cartilage covered head, comprising somewhat more than a hemisphere, is completely covered by the acetabulum and the surrounding glenoidal labrum which acts to deepen the acetabular cavity. Like other joints, it is enveloped by a capsule of which specially thickened portions are given separate ligamentous designations. They serve to limit excessive motion in the direction of pull of the surrounding musculature. The "Y" shaped ligament of Bigelow is probably the most important of these capsular thickenings about the hip joint and tends to limit excessive extension of the femur with respect to the pelvis. Because of the relative constancy of its length, this ligament permits extension of the femur to such a constant angle with the pelvis (the pelvifemoral angle), that any variation from this affords an objective measurement of flexion contracture of the hip.¹ Unlike other joints in the body, the hip joint is not formed by conjunction with the shaft of the femur, but with a bony projection which has been designated as the femoral neck and which lies almost

¹Read at the Eastern Section meeting, American Congress of Physical Medicine and Rehabilitation, Newark, N.J., April 10, 1954.
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entirely within the capsule of the joint. The most distressing consequence of this is that the main blood supply to the head and neck, derived from the lateral and medial circumflex femoral arteries, must pass along the femoral neck where they are subject to injury at the time of femoral neck fracture. Since this could not have been the primary function of the femoral neck, it seems not unreasonable to suspect that it serves other functions.

Joint Divisions

Before proceeding with this, it may be permitted to recall that generally speaking joints may be divided into those which are principally designed for mobility, and those which are principally designed for stability. In the former, there is a minimal degree of congruence between the articular surfaces with a corresponding reduction in stability, while in the latter the reverse is the case. This difference is well illustrated in the shoulder which is highly mobile as contrasted with the hip in which stability is of fundamental importance. The humerus, at its upper extremity, presents a neck formation which is inconsequential in length but which, strangely enough is directed backward and upward at almost the identical angle which the femoral neck makes with the shaft of the femur. This is, in all probability, the morphological representation of the fact that in the shoulder joint mobility is of fundamental importance while in the hip, stability and mobility are equally important.

Femoral Neck

It seems highly probable that the femoral neck, developed during the long course of evolutionary struggle for existence, is an anatomical mechanism which acts to preserve mobility in a hip joint, which has become highly congruent, for the purpose of stability. Because of its angulation with the femoral shaft, the femoral neck acts to convert flexion and extension of the thigh into a rotary motion of the head. Impingement of the neck against the glenoidal labrum

is thereby avoided and the range of possible motion markedly increased. Probably more important than this increase in range of motion is the fact that the *rate* of motion is similarly increased. Lateral displacement of the femoral shaft so that the mechanical axis of the femur lies medial to the anatomical axis of the shaft serves to establish a condition of instability which is the fundamental prerequisite of the rapidly alternating unilateral stance which is characteristic of rapid progression. This mechanism is one which operates only under normal anatomical relationships. It is not operable under conditions such as occur in arthritis, where both head and acetabular surfaces may be incongruent. While the femoral neck is a highly desirable anatomical structure essential to the preservation of normal mobility and stability, its loss is however, not incompatible with the restoration of satisfactory function in the painful hip in which motion has been abridged by the onset of arthritis.

Arthritis of the Hip

Arthritis of the hip in adults constitutes a large part of the practice to both the physiatrist and the orthopedic surgeon. With increasing speed in transportation and increasing longevity of the patient, it is apt in the future, to play an even greater role. From the point of view of therapy the progress of the arthritic patient may be divided into three different stages.

Pain: In the first stage, *pain* is the dominating symptom and presents the primary indication for treatment. Herein conservative measures should be employed. The hopes, entertained from the development and use of cortisone as well as its derivatives, have not been fulfilled; as in the past, reliance must be placed on analgesic drugs and physical therapy. Hydrotherapy, heat, electrotherapy, massage, rest followed by motion without weight bearing and muscle exercises to correct or prevent the development of undesired contractures still constitute the anchor sheet of treatment. Except for the performance of a

few relatively minor functions, such as the fitting of a brace, making of a plaster mould, palliative nerve resection, myotomy, or even the much over-rated osteotomy, the orthopedic surgeon serves his purpose only insofar as he applies the highly developed technics of physical medicine.

Impairment of Function: It is only when the unavoidable progress of the disease leads to unbearable *pain* or distressing *impairment of function*, thereby initiating the second stage, that the orthopedic surgeon uniquely fulfills his function. At this point, control of pain is a primary objective. In addition, restoration of the mechanical ability to perform fundamental motions dependent upon flexion of the thigh must be included. It is precisely this dual indication which has presented the orthopedic surgeon with a dilemma — impalement on either horn will find him most unhappy.

For the control of intractable pain, arthrodesis offers an apparently simple solution and has the merit of applicability to all conditions of the hip. Without disparaging its value, it has many unhappy drawbacks. Success does not invariably attend even the most expert surgical technic. Its proper conduct involves prolonged hospitalization and immobilization in precisely that age group of patients who are least likely and least able to support it. Furthermore, in a distressingly high percentage of cases, it is associated with subsequent intractable pain in the lumbar region which is quite as intolerable as the hip pain for which the patient originally submitted to the ankylosing operation. The procedure is open, however, to still more valid objections. Disregarding the fact that surgical fusion is a frank confession of inability to solve the hip problem and even discounting the technical difficulties involved, successful ablation of the hip joint establishes with finality the very limitation of motion for which patients often seek relief. Arthritis is notoriously unmindful of surgical reputation and the limitation of motion which affects one hip may at the same, or later time

affect the lumbar spine, the opposite hip, and one or both knees. It must be admitted that in such situations arthrodesis is not the best, or indeed, even a good solution. On the contrary, it is the worst answer to the problem and its application would certainly be subject to the reproach of bad surgical judgment.

Under such circumstances, it is hardly surprising to find the lay patient confused when confronted with the necessity of accepting fusion at the hands of one orthopedic surgeon; and one or another form of arthroplasty for precisely the same condition by another orthopedist of equal professional standing. The surgeon, on the other hand, is faced with the necessity of undoing surgically the fusion accomplished by nature or by his own technical skill. As a consequence, the same fertile imagination, the same mechanical ingenuity employed in the development of arthrodesing procedures, are now utilized to devise technics for arthroplasty.

In the beginning these efforts were largely of a reconstructive nature. Since the acetabulum and femoral head were obviously deformed it seemed not only necessary but also sufficient to remodel one or both of these structures in order to assure a successful outcome. Unfortunately, the artistry of these early bone sculptors went largely unrewarded. Circulatory disturbances with necrosis of the head, capsular and periarticular fibrosis and recurrence of osteophytic outgrowths more often than not resulted in failure. It was shortly after this that acetabuloplasty, based upon a complete biological misconception as to the nature of the osteophyte died aborning.

Although not chronologically, the next step in the painful pilgrimage to successful arthroplasty came with the interposition of material between the surfaces of the remodeled hip joint. With the exception of vitallium in the form of a cup, most of these methods have enjoyed but transitory favor.

Opinion appears to be sharply divided concerning the vitallium cup. Although some orthopedists, few in number, have

reported a high percentage of satisfactory results, the experience of the majority of orthopedic surgeons would appear to be to the contrary. Among the less serious of the objections to this procedure is the fact that it is not universally applicable. Far more serious is that a high percentage of those submitted to this operation developed subsequent pain and limitation of motion. While the acetabular and capital surfaces of the remodeled joint examined at secondary operation have been covered by a smooth, soft, but friable cartilage, the limitation of motion appears to be due to two factors namely, the marked thickening of the capsular structures so that it cuts with almost cartilagenous resistance, and the development of two distinct and coronally disposed osteophytic outgrowths, the one situated about the glenoidal rim and the other around the femoral neck at the point where the edge of the moving cup impinges upon the surface of the neck. This biological response to the buffeting by the metallic cup would seem to be unavoidable, although it may not be invariable as is indicated by the reported good results. That it does occur in the experience of most orthopedists would appear to be evident from the avidity with which they have embraced the newest development—the replacement of head and neck by a metallic or plastic prosthesis.

During the past few years, some twenty-five or more different varieties of these prostheses, made of stainless steel, vitallium and various plastics have been devised. Although it is probably too early to pass any definitive judgments on the procedure, sufficient evidence has already been adduced to warrant at least tentative conclusions. Categorically stated, it has not proved to be the touchstone by which the problem of hip disability can be resolved. As with the vitallium cup, it is not ideally suited for use in all cases. Even in cases of non-united fractures of the femoral neck, where the integrity of the acetabulum would seem to offer ideal mechanical conditions for replacement of the head by a prosthesis, the late results have fal-

len far short of those hopefully expected. In the arthridites, the late results have been even less satisfactory. Whether the plastic heads will prove satisfactory in the treatment of fractures, they and especially the nylon heads, do not appear to be able to stand the rigors of function in the arthritic hip. In those which have had to be removed at secondary operation, the surface of the prosthesis was found abraded and flattened, as if it had been held against an emery wheel. Whether the metallic prostheses will justify their continued use is still a moot question, but competent voices have already been raised to express serious doubt. From a purely biological point of view, it would seem most unlikely that the capsular fibrosis or the reparative growth of osteophytes would be any less pronounced than that which has followed the use of the vitallium cup. Indeed, the validity of a therapy which is aimed at the femoral head, while leaving the diseased and surgical traumatized acetabulum behind may be seriously questioned.

The final decision may be expected in the near future. But in the meantime there are many cases in which these procedures cannot be employed. There are many in which failure has followed their use. There is much pain to be alleviated and many a disability to overcome. The pressing need for an answer is immediately apparent. Those who have been frank enough to consider the possibility of failure have coined a new phrase—"redemptive" operations. Strange enough, the redemptive procedure for an unsuccessful effort to relieve the ankylosis by a prosthetic arthroplasty is, believe it or not, arthrodesis or the use of still another type of prosthetic replacement. The outlook, it must be admitted, is not pleasant, but it is not hopeless; not hopeless, that is, if the ideal of anatomical reconstruction be abandoned in favor of the less ambitious effort at functional rehabilitation.

My own effort in this direction was first made in 1934 as a two stage procedure and was published in 1943.² Since 1945, this operation has been con-

sistently performed as a one stage procedure and at times reported under the title of "resection angulation" operation.^{2,4,8} This operation is based upon the principle that painless flexion of the thigh is a primary condition for the performance of the fundamentally necessary acts of sitting, walking up or down stairs, putting on shoes, stockings, and the like. This is simply accomplished by excising the head and the neck of the femur, which releases the pelvis, relieves the inflamed acetabulum of the constant pressure from an incongruent femoral head and immediately resolves the primary indications for the relief of pain and the restoration of motion. This is not quite sufficient. In addition to mobility, stability must be re-established. This is accomplished by means of a Schanz type of osteotomy performed in the subtrochanteric region. The fragments of the osteomized femur are held in position by the use of a modified Blount-Moore nail so that plaster immobilization and prolonged hospitalization are eliminated. Passive motion is instituted immediately following the surgical procedure and ambulation is permitted, and indeed encouraged, on an average of three to four weeks post-operatively.

The method is universally applicable to all hip disabilities. It has been used in instances of bony ankylosis, in arthritis associated with congenital dislocation at the hip, tuberculosis, in Marie-Strümpell disease, in old non-united fractures of the femoral neck, and with especial preference, in the failures resulting from other operative procedures.

Whether employed as a primary or as a redemptive operation, this procedure has the particular merit that the patient may be assured either of complete relief from pain or its reduction to a tolerable minimum. In a high percentage of cases with the worst possible indications, definite improvement has been noted and patients previously doomed to institutional existence have been able to return to a partially normal and fruitful life. In selected cases, the results have been most gratifying in that

patients have been able to resume even onerous work. Until an ideal restoration of the hip joint as a whole has been achieved, this operation, in my opinion, offers the best possible hope for the severely disabled hip joint.

It must be emphasized, however, that this operation merely establishes the mechanical possibility of painless and stable motion. The actual functional rehabilitation must take place in the final stage of treatment. In this stage, as in the first, it is only by vigorous application of the methods of physical medicine that increasingly successful results may be expected. By careful attention to the ability to flex the thigh, without losing the ability to extend the thigh; by exercises to restore the power of the relatively lengthened pelvi-trochanteric muscles; by meticulous attention to muscle re-education and instruction in proper weight bearing, these patients can be salvaged for useful lives provided that the mechanics of the surgical procedure are not impaired. Without these physical methods for rehabilitation, the best operation is doomed to failure. With them, much improvement can be expected, even from a poor operation.

The treatment of these patients is a joint operation of two disciplines, the one providing the *mechanical* basis for motion, the other re-activating the motor power. The closer the cooperation, the more satisfactory will be the outcome. In our own hospital we are fortunate in having a highly developed physical medicine team. Our patients are grateful for the important contribution of this team to their ultimate outcome.

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Influence of Centripetal Rhythmic Compression on Localized Edema of an Extremity

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Chronic swelling with edema, localized either to an upper or lower extremity, is usually difficult to manage. Such a condition not only may be progressive and disabling but often is painful and unsightly. Sometimes severe trauma to the region of the hip or knee joint, with or without fracture of the head or other portions of the femur, leads to swelling and stubborn edema of the involved lower extremity. In the upper extremity, the edema and swelling usually develop shortly, or even a year or more, after radical mastectomy for cancer. The axillary dissection of lymph nodes, and the disturbance of axillary vessels resulting therefrom, contribute to the development of the swelling and subsequent chronic edema of the whole extremity. The arm may reach such dimensions that the condition is sometimes designated "elephantiasis chirurgica."¹

A number of conflicting theories and hypotheses have been advanced in the literature concerning the cause of this edema. Halsted,¹ and Holman, McSwain and Beal,² presented evidence supporting the theory that postoperative infection is the cause of the swelling and edema following surgery. Veal³ suggested that thrombosis of the axillary vein is an important cause of swelling of the arm

after radical mastectomy. This suggestion he supported by roentgenologic phlebograms. He demonstrated that angulation and displacement of the axillary vein were caused by the operation. Foley,⁴ however, was unable to show in his cases, after mastectomy, the clinical signs of thrombosis of the axillary vein; namely, dependent cyanosis, increased venous pressure and the appearance of collateral veins. His phlebogram in a case of massive elephantiasis of the arm demonstrated a normal axillary vein. Cohnheim⁵ demonstrated that ligation of the veins usually fails to produce edema, but Drury and Jones⁶ presented convincing evidence that sufficient increase in venous pressure, if maintained, will produce demonstrable edema.

Veal's³ emphatic distinction between lymphatic edema and the edema produced by venous obstruction is not easy to substantiate. In lymphatic edema, which is persistent, the tissue becomes hard and brawny; it pits slightly on pressure and does not wrinkle. These features, when compared with those of the edema of venous obstruction, in which the tissue is soft and will both pit and wrinkle, support the idea that the two are probably different stages of the same condition. It is believed that the characteristics of the so-called "lymph edema" are due to the greater tension of the edema fluid in the tissues rather than to the high protein content of the fluid.^{7,8} Careful follow-up in cases in

¹Read at the Thirty-second Annual Session of the American Congress of Physical Medicine and Rehabilitation, Washington, D.C., September 9, 1954.
²The Mayo Foundation is a part of the Graduate School of the University of Minnesota.

which edema develops provides convincing evidence that, at the inception of the edema, the tissue is soft and pits easily but that gradually, on enhancement of the edema, the tissue becomes hard and will not pit. Subcutaneous tissues in the region of long-lasting edema become indurated, thickened and have a tendency toward fibrosis.

Edematous swelling of the arm following radical mastectomy is of especially common occurrence among obese patients.^{8,9} This is attributed to the increased chance, among the obese, of removal of considerable lengths of main lymphatic trunks,^{8,9} regeneration of which may be inadequate to restore the flow of lymph. Late onset of the edema is explained by partial lymphatic obstruction and loss of elasticity of the skin.

The increase in swelling at the end of the day, or after walking, can be explained by the increase in production of lymph under circumstances of increased filtration from blood capillaries, as has been demonstrated to accompany muscular work.¹⁰ Krogh, Landis and Turner¹¹ reported that the rate of removal of fluid from the interstitial spaces depends on the quantity accumulated and that the rate is definitely higher when large than when small amounts accumulate. Small amounts which accumulate slowly are removed by absorption through the wall of the venous zones of the capillaries while, if an accumulation of interstitial fluid is large, the lymphatics carry on the removal. Consequently, in the presence of obstructed lymphatic channels, the swelling of the arm following mastectomy may get worse when exercise causes accelerated accumulation of fluid. Devenish and Jessop^{8,9} stated that when the limb is at rest, removal of the fluids is by true absorption at the venous ends of the capillaries. This makes the swelling less in the morning after the long rest at night. The investigators last named attributed the variation in the amount of swelling with exercise solely to the presence of lymphatic obstruction.

Because we realized the stubbornness

of the swelling and edema that are here under consideration, as well as the inadequacy of ordinary procedures in the management of such conditions, we decided to try centripetal rhythmic compression twice daily as an adjunct to the commonly used physical therapeutic procedures.

Methods and Materials

The conditions we observed were as follows:

Chronic edema of upper extremity following radical mastectomy,	6 cases
Edema of the arm, forearm and hand following fracture of neck of humerus,	1 case
Idiopathic edema of forearm and hand,	1 case
Edema of lower extremity:	3 cases
Comminuted supracondylar fracture of femur with peroneal palsy	(1)
Old fracture of the ankle	(1)
Idiopathic swelling of foot, and leg	(1)

The patients were treated in the Section of Physical Medicine and Rehabilitation of the Mayo Clinic, by the usual physical therapeutic procedures and by centripetal rhythmic compression of the edematous limb for one-half hour twice daily. This, then, was not a perfectly controlled physiologic experiment but a well substantiated clinical observation. Rhythmic compression of the extremity was performed by use of the "vasopneumatic" apparatus designed by Poor & Logan Manufacturing Company. This apparatus has been accepted by the Council on Physical Medicine and Rehabilitation of the American Medical Association. It is a conveniently housed pressure-pump with a distributing valve, connected separately through a series of rubber tubes to each of fourteen rubber cuffs. When the machine is switched into action, a pressure wave can be made to travel in the cuffs either centrifugally or centripetally. For this study the wave was set to travel centripetally (from fingers or toes toward the heart) throughout the period of treatment. The rhythmic compression rate was twenty times per minute and the cuff pressure varied from 50 mm. of mercury in the beginning to 80 mm. toward the end of the period of treatment.

In order to assess the effects of rhythmic

mic centripetal compression on the circulation in the involved extremity, the blood flow to the normal and to the involved extremity was measured by use of the venous occlusion plethysmograph with the compensating spirometer recorder.¹³ Measurements were made before treatment and at the end of one-half hour of treatment of the involved extremity. The cutaneous circulation was assessed in terms of the cutaneous temperature determined by means of thermocouples placed on the skin. The circulation in the terminal phalanx was assessed in terms of the pulse amplitude, determined by means of a digital plethysmograph applied to the phalanx. The changes in volume of the swollen extremity were determined by measuring the volume of water displaced in a graduated, large cylinder in which the limb initially was immersed up to a mark made on the extremity.

Results and Interpretations

As has been stated, comparison was made of the condition of the limb before and after one-half hour of treatment twice daily by intermittent centripetal rhythmic compression. Often the volume of the edematous extremity was found to be definitely reduced by 50 to 300 cc. at the end of treatment. After early treatments in a given case, most of the edema returned by the evening and the volume of the limb either became the same as it had been before treatment or was only slightly less. However, after several therapeutic sessions, the reduction in volume persisted and the limb remained definitely smaller than it had been initially.

Other important changes took place in the limb as treatment progressed. The nonpitting edema changed to the pitting type until, towards the end of a week or ten days of treatment, the skin became looser than it had been. The tissues, moreover, ceased to impart to the palpating hand the sensation of woodiness which had been predominant initially. This is one of the features that tended to confirm the idea that the increase of tension in the tissues, exerted

by the excessive accumulation of interstitial fluid, was the cause of the nonpitting characteristic of the edema, rather than the protein content of the edema fluid, as is believed by some investigators. It also is the basis for suggesting that the two types of edema often described are probably two stages of the same type of edema. Exaggeration of the edematous swelling stretches the skin until it feels very tense and the arm feels woody; the edema then is of nonpitting type. Dispersal of part of the interstitial fluid makes the arm feel softer and the edema becomes of pitting type.

If the region of swelling were painful, the pain usually disappeared as tightness of the skin diminished. At the start of treatment, some of the limbs felt cold and appeared somewhat cyanotic. As treatment progressed, the coldness and cyanosis tended gradually to be replaced by warmth and return of more nearly normal color.

Apropos of these changes, Huddleston and associates¹⁴ reported that use of the "vasopneumatic" apparatus brought about improvement of the discolored and cold, clammy condition of limbs paralyzed by poliomyelitis. Reichert¹⁵ experimentally demonstrated in healthy tissues that regeneration of lymphatics across a scar occurs as early as the fourth day after the incision. By the eighth day, regeneration of both deep and superficial lymphatics is physiologically adequate. Reichert gave evidence of the important role played by the lymphatics in aiding the veins to overcome edema and to restore the limb to its normal condition. Kirby and Sampson¹⁶ stated that the "vasopneumatic" apparatus increases the movement of fluid in the tissues of the extremities and is highly beneficial in arteriosclerosis obliterans, chronic lymphatic obstruction and acute surgical obstruction of veins. Winsor and Selle¹⁷ noted no beneficial effects of directional limb compression on the arterial circulation of the lower extremities. However, the number of treatments given each patient was not stated.

Table 1: Comparison of Circulation in Normal and Involved Extremity Before Treatment

Case	Condition, right or left	Average blood flow, ml./min./100 cc. tissue				Skin temperature, degrees C.			Pulse amplitude, mm.		
		Normal limb	In- volved limb	Difference ML	Per cent	Normal limb	In- volved limb	Difference	Normal limb	In- volved limb	Difference
1	Radical mastectomy (R)	4.5	4.5	-0.2	-4	34.6	34.9	+0.3	20	35	+15
2	Radical mastectomy (L)	2.8	1.5	-1.3	-46	34.4	34.1	-0.3	21	15	-6
3	Radical mastectomy (L)	3.3	2.4	-0.9	-27	31.0	31.9	+0.9	12	10	-2
4	Radical mastectomy (L)	3.5	3.9	+0.4	+11	34.6	34.8	+0.2	3	23	+19
5	Radical mastectomy (R)	1.6	2.1	+0.5	+31	30.3	30.1	-0.2	6½	9	+2½
6	Fracture neck of humerus (R)	4.4	6.2	+1.8	+41	35.3	35.5	+0.2	26	21	-5
7	Idiopathic swell- ing forearm and hand (R)	3.2	4.4	+1.2	+38	31.7	32.9	+1.2	15	11	-4
8	Radical mastectomy (R)	1.5	2.3	+0.8	+53	33.4	34.8	+1.4	10	18	+8
9	Swelling ankle and foot (R)	2.0	1.4	-0.6	-30	29.6	29.0	-0.6	9	6	-3
10	Compound frac- ture of head of femur (L)	2.3	3.8	+1.5	+65	30.8	31.9	+1.1	10	8	-2
11	Fracture below knee (R)	2.1	1.5	-0.6	-29	26.9	27.4	+0.5	3	6	+3

Table 2: The Influence of Centripetal Rhythmic Compression on the Blood Flow in the Involved Extremity

Case	Condition, right or left	Number of treatments	Maximum volume reduction, ml.	Blood flow in involved extremity, ml./min./100 cc. tissue		
				Before treatment	After treatment	Percentage difference
1	Radical mastectomy (R)	18	150	4.3	5.2	+21
2	Radical mastectomy (L)	10	300	1.5	1.7	+13
3	Radical mastectomy (L)	15	150	2.4	2.1	-13
4	Radical mastectomy (L)	9	0	3.9	3.3	-15
5	Radical mastectomy (R)	30	0	2.1	1.8	-14
6	Fracture neck of humerus (R)	7	0	6.2	7.4	+19
7	Idiopathic swell- ing forearm and hand (R)	4	50	4.4	4.0	-9
8	Radical mastectomy (R)	36	300	2.3	1.8	-22
9	Swelling ankle and foot (R)	5	150	1.4	1.6	+14
10	Compound frac- ture of head of femur (L)	25	200	3.8	4.8	+26
11	Fracture below knee (R)	5	200	1.5	1.8	+20

It was very difficult to evaluate the effect of centripetal rhythmic compression on the quantity of blood flowing through a highly edematous extremity. The flow in the intact extremity was not consistently higher than that in the edematous one (table 1). In fact, there seemed to be no consistent difference between the normal extremity and the swollen one with regard to blood flow, skin temperature and amplitude of digital pulse (table 1). The effects of swelling and edema on the circulation of an extremity apparently are not uniform. In some cases circulation may be reduced, but in others it seems to be increased. The slightly higher skin temperature and the greatly increased pulse amplitude in a few of the cases were attributable to the moderately increased resistance to the return of blood from the terminal phalanx from which the readings were obtained. As the swelling and edema became less, the discrepancy between the readings obtained from the two extremities gradually became less.

Centripetal rhythmic compression at a pressure of 50 to 80 mm. of mercury did not increase the flow of blood to the affected limbs. In table 2 are demonstrated the average values for blood flow before, and at the end of, a single treatment and, most of the time, at the end of the course of treatment. It is clear that, in most cases, the changes were insignificant. The influence of therapeutic rhythmic centripetal compression on the circulation in the involved extremity was not consistent in spite of the fact that clinically the treatment had consistently produced definite improvement. In the cases in which circulation was reduced improvement in swelling and edema of the involved extremity was as marked as in those in which blood flow was increased. This gave the impression that the changes in volume flow of blood to the involved extremity are not the basis for the clinical improvement following daily treatment by centripetal rhythmic compression. These findings demonstrated to us that the volume flow of blood to the extremity was not significantly influenced by the treatment.

Rather, the reduction in edema and elimination of tension in the subcutaneous tissues facilitated the exchange of electrolytes and fluids and led to a better nutritive state of the part involved. The physician may hope that, in due time, development of collateral blood vessels and re-establishment of central connections of newly developing lymphatics will stabilize electrolyte and fluid exchange in an involved extremity and furthermore, he may hope that the swelling and edema will disappear. Repeated mechanical mobilization of interstitial fluid which has accumulated from interference with lymphatic drainage and from insufficiency of collateral blood vessels facilitates regeneration of lymphatic connections, re-establishment of collateral blood vessels and development of new avenues for both blood and lymph.

Summary

Daily application of centripetal rhythmic compression, by use of the "vasopneumatic" apparatus, to a limb swollen and edematous as a result primarily of chronic lymphatic obstruction, is helpful. The swelling and edema tend to disappear gradually and the tissues become softer; pain usually is relieved, and the consistency and color of the skin usually return to normal.

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COMMITTEE REPORTS

The following reports were presented at the annual business meeting of the American Congress of Physical Medicine and Rehabilitation, September 6-11, 1954, Hotel Statler, Washington, D. C.

Advances in Education

The Committee on Advances in Education set as the theme of its activities for the year the promotion of educational opportunities for the young physician. While we realize we cannot act in any official capacity to pronounce standards and requirements for physician training, we believed we could be useful in fostering ideas and ideals to raise training programs above the necessary minimums to meet official standards.

With these aims in mind, three innovations were made in the plans for the Instruction Seminars with the idea of attracting the young physicians in training. First, the seminars were scheduled in a concentrated block of time which preceded and did not conflict with the scientific sessions of the Congress. Second, the seminars consisted of a series of lectures on only two or three disease topics, covering these limited topics fairly completely. Third, necessarily from this second change, the distinction between basic science and clinical topics was abandoned. Each lecture was to include both basic science and clinical aspects of the subject. The committee would welcome comments and criticisms from the members of the Congress of these changes and feels it would be helped by the suggestions for future improvements.

A second activity of the Committee was to sponsor a discussion-luncheon of leaders of physician training programs. A fair amount of informal exchange of ideas was achieved by the atmosphere of such a meeting. It is hoped that future similar meetings will be of even greater value.

Your chairman is grateful for the full cooperation and active work of all the members of the committee. The committee, however, needs more suggestions and comments from members outside the committee, if it is to represent a wide cross-section of the Congress.

Respectfully submitted,
Robert C. Darling, *Chairman*
Harold Dinken
Earl C. Elkins
Frederic J. Kottke
Donald L. Rose

Awards for Scientific Exhibits

The selections of this committee were published in October, 1954 issue of the *Archives of Physical Medicine and Rehabilitation*.

Respectfully submitted,
Donald A. Covalt, *Chairman*
Otto Eisert
A. David Gurewitsch
William H. Northway
Raoul C. Psaki

Balneology and Health Resorts

At the annual session of the Congress in Chicago this committee sponsored a scientific exhibit which is repeated this year.

At a well attended luncheon meeting, the committee discussed, with Spa representatives, the problem of improving the scientific standards of spas in order to evaluate the viewpoint of spa owners in general. It was mutually agreed that ethical cooperation would benefit the eventual organization of spas.

The following details were accomplished during the past year:

1. Survey was made throughout the United States, Canada, Central and South America for the purpose of establishing a list of spas.

2. Every known existing spa was contacted to evaluate its medical and adjurant facilities. Detailed reports were received from about thirty spas. Twenty showed keen interest to join a national society.

During the year the committee members were in close contact with each other by correspondence. Several meetings were held.

The Committee submits the following recommendations:

1. To foster basic research in balneology;
2. To further cooperation between the spas and the medical profession, and

3. To encourage the formation of an association of spa owners to improve public relations through their own efforts.

The Committee respectfully requests the sum of \$200 to carry on its work.

Respectfully submitted,
Hans J. Behrend, *Chairman*
William Bierman
Kristian G. Hansson
Duane A. Schram
Ferdinand F. Schwartz
Samuel A. Warshaw

Braces, Splints, and Prostheses

The members of this committee suggest that this committee of the Congress act as a clearing house for new devices so that all Congress members be informed of new developments in the field of braces, splints and prostheses. To this end, all Congress members might be circularized, asking that they submit information, pictures, or actual specimens of new devices to this Committee. The committee members would then examine all devices submitted and select those to be presented to the membership at large. At each Congress meeting, devices so selected could be exhibited with proper credit to the members submitting the device.

During the past year the chairman of this committee attempted to determine by questionnaire what, if any, limitations were placed on the prescription of, and the payment for, braces by the six agencies most frequently called upon for the care of the physically handicapped. This questionnaire was sent to fifty-three selected physiatrists in all states having resident physiatrists, as well as to the District of Columbia, Puerto Rico, and Canada. Forty-two replies were received and represented twenty-nine states, as well as the District of Columbia, Canada and Puerto Rico. The response to this questionnaire may be summarized as follows:

1. All agencies in most areas showed no discrimination against the general practitioner or any of the medical and surgical specialties.

2. Judging from the comments added to the questionnaires by a large number of physiatrists, very few agencies refused to accept the prescription of the physiatrist once it was shown that this specialist was interested in and capable of adequately prescribing for necessary bracing.

Respectfully submitted,
Robert L. Bennett, *Chairman*
Arthur S. Abramson
John H. Aldes
Edward E. Gordon
Morton Hoberman
Jessie Wright

Constitution and By-Laws

At the business meetings of the Congress in 1953, several amendments to the Constitution were presented in writing to be voted on at this session. These were published in the July, 1954 issue of the *Archives*. It did not appear to this committee on Constitution and By-Laws that further changes were necessary at this time.

Respectfully submitted,
Fred B. Moor, *Chairman*
Frances Baker
O. Leonard Huddleston

Cooperation with Air Force, Army, Navy, Public Health Service, and Veterans Administration

The committee respectfully submits the following recommendations:

1. That constant stimulation and support be given the various government agencies for the further development and strengthening of this specialty in all government hospitals.

2. That recruitment help be given these agencies for the procurement of residents, therapists, and physiatrists, so that each hospital may ideally have a qualified physiatrist, with more direct supervision of all rehabilitation personnel.

3. That since the possession of in-patient beds provides more efficient patient care and control, adds to the usefulness of Physical Medicine and Rehabilitation, enhances local prestige, and builds morale, it is strongly recommended that the agencies concerned be repeatedly, but tactfully, urged to establish bed allocations at those hospitals where the need is apparent and where space and personnel are available.

4. That if the efforts of this committee are to prove fruitful and useful, it is essential that more vigorous and purposeful action be taken by the executives of the Congress. It is, therefore, recommended that the president of the Congress, or his official representative, take definitive and purposeful action to see that the approved recommendations that are annually submitted be aggressively implemented.

Respectfully submitted,
Harold B. Luscombe, *Chairman*
A. B. C. Knudson
Anton A. Tratar

Cooperation with Food and Drug Administration

No material was submitted to this committee for its review or consideration.

Respectfully submitted,
Ralph E. DeForest, *Chairman*
Clarence W. Dail
Fritz Friedland
Edward M. Krusen, Jr.
Paul A. Nelson
Charles S. Wise
Harry T. Zankel

Coordination and Integration of Physical Medicine and Rehabilitation in Geriatrics

This committee was established by the Congress at its annual meeting in 1953. At the first committee meeting, realizing the scarcity of available pertinent information, it was decided to conduct a survey of all approved departments and to invite physiatrists who volunteered to participate in the study.

After repeated modifications a six-page questionnaire was adopted and the Chairman was commissioned to distribute this material. The return was unexpectedly good. Out of fifty-nine questionnaires mailed, thirty-three were returned. It was gratifying to note that most of those who returned the questionnaire, made special effort to study it carefully and to make valuable recommendations. Since there was not sufficient secretarial help available the tabulation of the replies are necessarily delayed.

On the whole the members seemed to realize the magnitude of the problems and the physiatrists' stake in their solution. Some, however, expressed concern over the physiatrists "taking over" geriatrics. This concern must have grown out of a misinterpretation of the questionnaire and the aims of the committee; although an editorial in the November issue of the *Archives* attempted to clarify this point. We do not feel that the care of the aged and chronically ill is an exclusive practice of the physiatrist. At the same time we realize that he is the one who, by the very nature of his specialty, has more opportunity to get in contact with the elderly and chronically ill patients than most of the other specialists. It is then felt that it is within the realm of the Congress to explore this field and to delineate the physiatrists' place in geriatrics.

The committee also contacted two other professional societies concerned with geriatrics. We have approached the Gerontological Society and the American Geriatrics Society requesting them to appoint committees to cooperate with us. Both groups accepted this plan enthusiastically and we are awaiting their final action.

Respectfully submitted,
Michael M. Dacso, *Chairman*
Nila Kirkpatrick Covalt
Harold Dinken
Karl Harpuder
George M. Piersol

Correlation of Physical Medicine and Psychiatry

A formulation of the function and scope of this committee was made under the following headings:

- a. General function
- b. Scope
- c. Special areas of interest—general and immediate
- d. Other committees to which we are closely related
- e. Professional organizations outside of the Congress whose work is of special interest to this committee
- f. How this committee serves to meet the needs of the members of the Congress

- g. How can members of the Congress participate in assisting this committee

In a joint effort the committee on Medical Rehabilitation (Dr. Benjamin Simon, Chairman) of the American Psychiatric Association together with our committee presented a panel program during the annual meeting of the A.P.A. in St. Louis discussing the topic "The Contribution of Physical Medicine to the Rehabilitation of the Psychiatric Patient."

Several other committees of the Congress were contacted through correspondence with the objective of surveying the type of psychiatric problems encountered by those committees. Some of the replies suggested joint meetings.

Plans: a) To have a "sister panel" to the one presented at the American Psychiatric Association meeting. This panel would consider the subject of "The Role of Psychiatry in Physical Medicine and Rehabilitation"; b) to continue to investigate the type of psychiatric problem with which a physiatrist may be confronted; c) a greater liaison with related committees, and d) to explore further the matter of psychiatric sheltered workshops.

Recommendations: a) A discussion dealing with psychiatric aspects of physical medicine and rehabilitation be included in the Instruction Seminar; b) that committees and members be encouraged to submit to this committee problems of a psychiatric nature; c) that each committee prepare for distribution a statement of its function and scope, and d) that there be a special annual meeting of all committees.

Respectfully submitted,
Jack Meislin, *Chairman*
William Bierman
Daniel Dancik
A. Ray Dawson
Everill W. Fowlks
Henry Morelewicz

Finance

The annual financial report of the American Congress of Physical Medicine and Rehabilitation was published in the July, 1954 issue of the *Archives of Physical Medicine and Rehabilitation*.

Respectfully submitted,
Louis B. Newman
Walter M. Solomon*
Charles S. Wise

*Dr. Solomon died on Dec. 30, 1954.

Foster, Encourage and Coordinate Research Projects

Each member of the committee was contacted by mail with a summary of last year's report and a request for possible aims for this year. Since there was no unanimity of

opinion, the chairman selected the most outstanding project from the previous year and wrote again to each committee member asking him to pursue a prescribed course of action on this project.

The cooperation of most of the committee members was wholesome and honest. Each committee member was asked to contact a manufacturer of Physical Medicine and Rehabilitation equipment. He was asked to get the manufacturer's reaction to a proposal to use this committee as a sounding board and liaison in the introduction of any newly proposed research projects. The idea had nothing to do with "thought control" or control of research itself but rather as a mutual agreement on the direction of the research. The committee was not seeking funds, nor were they directing research, but they were attempting openly and honestly to counsel and guide good and competent research in an effort to discourage eventually fraudulent and distorted advertising, some of which is found in acceptable medical journals.

The summary of the results of this canvass, while not conclusive or all encompassing, was hopeful. Each committee member and the President of the Congress was sent copies of the summary for remarks. Not a single dissenting remark was made by a committee member. Constructive criticism was forthcoming, and if the committee could ever meet, some of the ideas could be consummated.

It is hoped that the pursuance of this present project will be continued in the years to come, so that the American Congress of Physical Medicine and Rehabilitation may be looked to for its personal integrity and interest in research and its contribution to medicine.

Respectfully submitted,
Robert W. Boyle, *Chairman*
Murray B. Ferderber
Frances A. Hellebrandt
Louis B. Newman
William D. Paul
Wilbur A. Selle

Gold Key Award

The selection of this committee was published in the October, 1954 issue of the *Archives of Physical Medicine and Rehabilitation*.

Respectfully submitted,
Howard A. Rusk, *Chairman*
Arthur C. Jones
A.B.C. Knudson
Gordon Martin
Donald L. Rose

Legislation

The Legislation Committee has no positive activity to report; no questions or problems

were referred to the committee by the President or Board of Governors. It is the recommendation of this committee to the Congress and the Board of Governors that they give serious consideration to the problem of congressional legislation in the field of rehabilitation.

Each year, more bills in Congress deal with development of support for or regulation of various activities in rehabilitation. As the physicians most directly concerned with the rehabilitation of the physically handicapped, we have not made any effort to advise Congress concerning this legislation.

It is the recommendation of the Committee on Legislation that the Congress should consider this as one of their major problems. The American Congress of Physical Medicine and Rehabilitation cannot handle this problem effectively by appointing a minor committee which meets only once a year.

To provide effective advice on congressional legislation requires that this organization have an active committee which has both time and facilities to collect information and present it before the proper congressional committees.

Respectfully submitted,
Frederic J. Kottke, *Chairman*
Herman L. Rudolph
Bror S. Troedsson

Meeting Place

A number of invitations was issued to the Congress relative to the meeting place for 1957. Dallas, Denver and Los Angeles were the cities selected by the committee for consideration by the general membership. The city of Los Angeles was selected for the 1957 meeting. At present the meeting schedule is Hotel Statler, Detroit, August 28-September 2, 1955, and Hotel Ambassador, Atlantic City, September 10-14, 1956. Announcement concerning headquarters hotel and meeting dates for 1957 will be made later.

Respectfully submitted,
Walter J. Zeiter, *Chairman*
Everill W. Fowles
Herbert W. Park
James W. Rae, Jr.
Edward B. Shires

Membership

The activities as usual concerned themselves with the effort of securing new members and informing prospects of the advantages of association. Groups contacted were the Veterans Administration, local and state medical societies and Congress members. However, it was possible to augment the group by an additional thirty-nine members. Sixteen members were dropped for non-payment of dues or resignations, and six were

deceased.

To promote a feeling of cooperation in securing new applications, the *Archives* published application blanks and such blanks were also included in much of the mailing.

The net result of our activities showed an increased membership but not to the desired level. It is sincerely hoped that this committee will be divided into geographic areas and have all members serve as sources of contacts. In this way, our membership can definitely be enlarged.

Respectfully submitted,
Max K. Newman, *Chairman*
Elizabeth Austin
Harriet E. Gillette
Thomas F. Hines
Samuel Sherman

Nominating

This committee recommends for nomination the following officers: President—William D. Paul, Iowa City; President-Elect—Howard A. Rusk, New York City; First Vice-President—Gordon M. Martin, Rochester, Minn.; Second Vice-President—A. B. C. Knudson, Washington, D. C.; Third Vice-President—Donald L. Rose, Kansas City, Kans.; Fourth Vice-President—Arthur C. Jones, Portland, Ore., and Fifth Vice-President—Frederic J. Kottke, Minneapolis.

We nominate for Secretary, Frances Baker, San Mateo, California; Treasurer, Frank H. Krusen, Rochester, Minn.; Executive Director, Walter J. Zeiter, Cleveland, and Executive Secretary, Dorothea C. Augustin, Chicago.

Charles S. Wise is nominated to succeed himself as a member of the Finance Committee.

A. B. C. Knudson, Washington, D. C., and O. L. Huddleston, Santa Monica, California, are nominated to succeed themselves as representatives of the Congress on the American Board of Physical Medicine and Rehabilitation.

Respectfully submitted,
George M. Piersol, *Chairman*
Kristian G. Hansson
Fred B. Moor
Walter M. Solomon
Arthur L. Watkins

Prize Lecture

Papers submitted for this award have been reviewed and it is the decision of the committee that no award be made for 1954.

Respectfully submitted,
William D. Paul, *Chairman*
O. Leonard Huddleston
Frederic T. Jung
Walter S. McClellan

Medical Auxiliary Services Related to Physical Medicine and Rehabilitation

This committee conducted a survey concerning salaries and other benefits offered to physical therapists and occupational therapists. The following results have been tabulated:

Summary of Salaries and Other Benefits Offered to Physical Therapists and Occupational Therapists

	Private Practice	Clinics	Gen'l Hosp.	Univ. Hosp.
I Starting				
High	\$4,800	\$4,000	\$3,900	\$3,600
Low	1,800	2,100	2,460	2,280
Average	3,280	3,132	3,160	3,208
II Experienced				
High	6,000	5,000	4,250	4,284
Low	3,000	2,520	3,060	3,180
Average	3,918	3,729	3,597	4,057
III Chief Therapist				
High	6,500	6,000	4,800	4,800
Low	5,100	3,000	3,600	3,600
Average	5,000	4,350	4,121	4,363
IV Supervisor				
High	None	6,000	5,300	5,100
Low	Reported	4,800	3,900	3,600
Average		5,060	4,640	4,728
V OTHER BENEFITS				
1. Blue Cross	2	7	9	2
2. Blue Cross and Blue Shield	6	5	5	5
3. Bonus	1	3	0	0
4. All Holidays	14	4	11	10
5. Housing	0	2	0	0
6. Increment Raises				
6 months	0	7	8	3
1 year	14	5	5	10
7. Insurance Policy	1	8	6	3
8. Laundry of Uniforms	0	8	5	9
9. Meals (1 day)	0	4	3	0
10. Retirement Benefits	0	4	3	0
11. Sick Leave				
5 day	0	0	1	0
12. Sick Leave				
10 day	0	2	0	0
12-15 day	0	8	24	16
Accumulative	0	0	8	6
13. Social Security	0	3	14	7
14. Uniforms Furnished	0	1	1	1
15. Vacation				
2 weeks	0	11	13	10
3 weeks	0	2	11	6
4 weeks	0	2	4	2

Respectfully submitted,
Jessie Wright, *Chairman*
John C. Allen
Herman J. Bearzy
A. Ray Dawson
Bruce B. Grynbaum
Sedgwick Mead

Rehabilitation Centers

The professional conduct of rehabilitation centers is basically of medical concern requiring (a) medical diagnosis, (b) medical evaluation, (c) medical supervision of treatment, (d) coordination of the rehabilitation team, and (e) medical judgment of final results of therapy and planning for vocational placement and training.

The American Congress of Physical Medicine and Rehabilitation should work with all who are concerned with the rehabilitation of handicapped persons.

Definition of what constitutes a rehabilitation center is necessary. Specialists in Physical Medicine and Rehabilitation should cooperate with the entire medical profession to set standards.

This committee recommends (a) perpetuation of the committee on rehabilitation centers as a standing Congress committee; liaison with general practitioners and medical specialists should be stressed, (b) encouragement of affiliation of all physicians identified with rehabilitation centers to meet at the time of the annual meeting, (c) invitations issued to executive directors of rehabilitation

centers to attend Congress meetings and share in planned discussions pertaining to common interest regarding centers, (d) consideration by the Board of Governors of invitations to representatives from all official organizations of therapists to yearly discussions on rehabilitation centers, (e) associate membership is suggested for outstanding rehabilitation center personnel upon recommendation by the Membership and Rehabilitation Centers committees.

Respectfully submitted,
Arthur C. Jones, *Chairman*
Herman J. Bearzy
Nila Kirkpatrick Covalt
George G. Deaver
Walter J. Lee
Ralph E. Worden

MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

Personals

At the annual meeting of the National Association of Clinic Managers recently held in Chicago, **Walter J. Zeiter**, Cleveland, was installed as president for 1955. This group is dedicated to the advancement of clinic management and clinic personnel in the United States and Canada. — **Frederick J. Balsam**, formerly of Tennessee, is serving as Chief, Program Development, VA Central Office at Washington, D. C. — The Arkansas Chapter of the American Occupational Therapy Association heard Captain **Edward P. Reese**, Hot Springs, Ark., discuss "Rheumatoid Arthritis" at one of their recent meetings. — **Arthur M. Pruce**, Atlanta, Ga., was recently elected president of the Atlanta Rheumatism Society; Dr. Pruce was also promoted to Assistant Professor of Anatomy at Emory University Medical School. — **Miland E. Knapp**, Minneapolis, has been chosen to supervise the rehabilitation services of the Glenwood Hills Hospital.

Gordon Martin, Rochester, Minn., was a guest speaker at the two-day meeting of the Minnesota Association of Nursing Homes. — At the 80th session of the Oregon State

Medical Society, **Albert L. Cooper**, Seattle, sponsored the scientific exhibit "Physical Medicine and Rehabilitation." — **Leonard F. Bender**, since completing his tour of duty in the U. S. Navy, has been appointed to the staff of University of Michigan Medical School as Assistant Professor; he is also serving as a member of the Junior Medical Advisory Staff of the University Hospital at Ann Arbor. — **Harvey E. Billig, Jr.**, Los Angeles, introduced the subject and participated in a panel symposium on "Whiplash Injuries to the Cervical Spine and Associated Structures: Medical, Legal and Safety Aspects" presented at Pepperdine College in Los Angeles last December. — The VA Hospital at Houston, Tex., along with **Lewis A. Leavitt**, Chief of PMR Service, hosted a workshop conference on "Integrating Resources for Maximum Rehabilitation."

Val Rapp, Tomah, Wis., spoke at the Wisconsin Chapter meeting of the AART. — **Dominic A. Donio**, Allentown, Pa., presented the paper "Physical Medicine and Rehabilitation in General Practice" at the annual meeting of the Delaware Academy of General Practice. — **Isadore Levin**, Emil J. C. Hildenbrand, and Charles D. Shields repre-

sented the Congress at the meeting of the AMA Council on Industrial Health, Shoreham Hotel, Washington, D.C., on January 25. — **Harry J. Bugel**, Nashville, Tenn., and **Ferdinand F. Schwartz**, Birmingham, Ala., participated in the Southeastern Chapter meeting of the AART in Murfreesboro, Tenn. — **Donald A. Covalt**, New York City, received an award from the National Rehabilitation Association; he is also serving as a member of the NRA board of directors. — **S. G. Feuer**, Brooklyn, discussed "The Rehabilitation of Radical Mastectomy Patient" before a Naval Reserve Hospital Company. — **Elizabeth Austin** and **John Aldes** of Los Angeles were participants in "Ask the Doctor" program sponsored by the Los Angeles County Medical Association. Dr. Austin discussed "Management of Polio Cases," and Dr. Aldes' topic was "Helping the Handicapped."

Illegal Operation of Medical Diathermy Equipment

The Council on Physical Medicine and Rehabilitation of the American Medical Association brings the information in this article to the attention of the medical profession because of the urgency for complying with the regulations of the Federal Communications Commission regarding the operation of medical diathermy apparatus. In 1947 the Federal Communications Commission allowed users of the old type, nonconforming equipment to comply with the regulations within six years. This period ended on June 30, 1953. A February, 1954, Public Notice from the Federal Communications Commission stated that a number of medical diathermy machines that did not comply with the Commission's rules were still being operated by persons who either were not aware of the fact that they were violating the law or did not appreciate the importance of the reasons for the establishment of the present regulations regarding diathermy equipment.

In addition to the inconvenience caused by interference with standard radio and television broadcasts, the operation of diathermy apparatus that radiates excessively constitutes a serious potential hazard to public safety. The Federal Communications Commission Public Notice has clearly set forth the nature of these hazards. Since it has been conclusively demonstrated that both airplanes and missiles can be guided to their targets by following radio signals, it is possible that excessive radiation from nonconforming diathermy apparatus could be used by enemy aircraft as a navigational aid in flying to target areas in the United States. Diathermy apparatus that radiates excessively may interfere with radio communications. Radio is vital not only in the operation of fire and police departments but also for direct com-

munication between airplanes and between airplanes and the ground and as a navigational aid to aircraft while in cross-country flight as well as in landing (particularly when visibility is limited.)

The Council on Physical Medicine and Rehabilitation urges that the use of all old, nonconforming, non-FCC type-approved medical diathermy equipment be discontinued at once. It is urged that apparatus be operated that has been type-approved by the Federal Communications Commission and bears an FCC type approval number. This number means that the Commission's engineers have tested a prototype of the machine and have found that it complies with the requirements. Although type approval is not an absolute guarantee that the apparatus will not cause interference, it does indicate that under normal conditions of installation and operation the apparatus will not do so. As an alternative, the physician may have a competent engineer certify that an old, nonconforming type of diathermy apparatus is capable of operating in accordance with the Commission's rules; however, it is usually necessary to have a skilled engineer make extensive modifications in the device as well as carry out special field intensity tests. This procedure may prove more costly than the acquisition of an FCC type-approved machine.

For the information of the medical profession, the Council on Physical Medicine and Rehabilitation is able to provide a list of diathermy apparatus that have met the minimal acceptance requirements for such devices established by the Council and that have been type-approved by the Federal Communications Commission.

Reprinted, with permission, from December 25, 1954 J.A.M.A.

New Apparatus Developed

A dependable, inexpensive, easily portable apparatus for making direct blood pressure readings has been developed by the Laboratory of Technical Development of the National Heart Institute, Public Health Service, U. S. Department of Health, Education, and Welfare. This device, when attached to a conventional electrocardiograph, produces accurate pressure recordings formerly available only by the use of costly and complex instruments.

Speech and Hearing Clinic

A speech and hearing clinic recently began operation on the Los Angeles campus of the College of Medical Evangelists as part of the White Memorial Clinic. The clinic, designed to provide treatment for all types of speech disorders, will be a part of the physical medicine department to serve as a diagnostic and rehabilitation center.

Apparatus Accepted

The following information relative to apparatus accepted by the Council on Physical Medicine and Rehabilitation of The American Medical Association is reprinted, with permission, from the December 11 and December 25, 1954 issues of The Journal of The American Medical Association.

Sherman Muscle Stimulator, Model ME1: Crest Laboratories, Inc., 84-11 Rockaway Beach Blvd., Rockaway Beach 93, N. Y.

The Sherman Muscle Stimulator, Model ME1, is a generator of electric currents for stimulating normally innervated voluntary muscle. The instrument is not intended for diagnostic use. The body of the instrument measures 27 (height) by 45 by 30 cm. (10½ by 18 by 12 in.) and weighs 7.3 kg. (16 lb.). It is shipped in a carton measuring 29 by 47 by 34 cm. (11½ by 18½ by 13½ in.) and weighing 9 kg. (20 lb.). It requires 60 cycle alternating current at 110 to 120 volts and draws 50 to 100 watts. Accessories include a bipolar pad, a connecting cord, a bottle (30 cc.) of fluid for moistening the electrodes, a line cord, three pad-fastening straps, and an instruction booklet.

The apparatus delivers two kinds of current. One consists of single abrupt shocks that can be made to follow each other at any desired frequency, from 1 to 100 per second. The other consists of an amplitude-modulated (surging) alternating current; its carrier frequency is 700 per second, and its amplitude is built up, maintained, and reduced cyclically, with the number of such modulation cycles per second being determined by setting a dial.

Dakon Hydrotherapy Equipment, Models AST, PST, PPT, CLS, CHS, CHP, CLP, GST-4, F-28, F-21, F-18, FH-12, FC-12, F-12, and ETE: Dakon Tool and Machine Co., Inc., 1836 Gilford Ave., New Hyde Park, N. Y. (Detailed description relative to this equipment is published in the Dec. 25, 1954 J.A.M.A.)

Medical Education Seen at Crossroads

America's medical schools face a crisis which can only be resolved by increased public interest and support, according to a twenty-five-cent pamphlet, "The Challenge to Medical Education" just published by the Public Affairs Committee, 22 E. 38th Street, New York City.

Chancellor Henry T. Heald of New York University in an introduction calls attention to one of the main challenges faced by these "complex centers for training" by pointing out that "doctors are called up less and less to heal the sick and more and more to keep people well. Medical education must not only keep abreast of society's needs; it must anticipate them."

Fellowship Awards

Alpha Gamma Delta, International Women's Fraternity, and the National Society for Crippled Children and Adults, Inc., jointly sponsor a Counselor Training Program designed to provide information and technics concerning the placement and vocational adjustment of severely handicapped persons. The eighth such course will be held at the Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, from June 20 to July 15, 1955.

For further information or additional bulletins, please contact the Personnel and Training Service of the National Society for Crippled Children and Adults, Inc., 11 So. La Salle St., Chicago 3.

Recent Publications by Members

Raoul C. Psaki, with co-authors, "Post-operative Management of Patients with Lower Extremity Amputations." The Journal of The American Medical Association, November 13, 1954.

Albert A. Martucci, "Review of the Literature and Clinical Applications of Ultrasonics." The Pennsylvania Medical Journal, November, 1954.

Michael M. Dacso and Howard A. Rusk, "Pathophysiologic Considerations in Geriatric Rehabilitation." Journal of the American Geriatrics Society, September, 1954.

Everill W. Fowlks, "Plastic Splints for Neurological Conditions." The Journal of The American Medical Association, November 20, 1954.

Ralph Worden, "Rehabilitation Centers: Planning, Administration, Personnel, Finance." The Journal of The American Medical Association, December 18, 1954.

Edward E. Gordon, with co-author, "Does Occupational Therapy Meet the Demands of Total Rehabilitation?" The American Journal of Occupational Therapy, November-December, 1954.

Robert M. Stecher, "Osteoarthritis." Missouri Medicine, December, 1954.

John H. Kuitert, with co-author, "Introduction to Clinical Application of Ultrasound." The Physical Therapy Review, January, 1955.

Y. T. Oester, Arthur A. Rodriguez, and co-author, "The Clinical Application of Electromyography at Cook County Hospital." The Physical Therapy Review, January, 1955.

O. Leonard Huddleston, "Principles of Neuromuscular Reeducation." The Journal of The American Medical Association, December 11, 1954.

The following papers were published in the October, 1954 issue of Department of Medicine and Surgery Information Bulletin:

Frederick J. Balsam, "The Total Evaluation of the Patient."

Samuel G. Feuer, with co-authors, "A Home-Care Program in Physical Medicine and Rehabilitation."

Frank J. Schaffer, with co-author, "The Physical Medicine and Rehabilitation Bed Service, VA Hospital, Columbia, S.C."

Irving Tepperberg, "Physical Medicine and Rehabilitation in the VA Regional Office, New York."

Maxwell D. Flank, with co-authors, "Work Capacity Appraisal for Paraplegic Patients in Manual Arts Therapy."

Herman C. Lund, with co-author, "National Employ the Physical Handicapped Week Display."

The following papers were published in the December, 1954 issue of The Physical Therapy Review:

Walter Treanor, "Rehabilitation of the Brain-Injured."

Walter Treanor, "Restitution of Movement Following Brain Injury."

Walter Treanor and Raoul C. Psaki, "Patterns of Restitution of Motor Functions."

Walter Treanor, and co-authors, "Selective Reeducation and the Use of Assistive Devices."

New ARC Blood Film

Presentation of a color film with sound, "Prescription for Life," was made to the American National Red Cross for education of the public on the organization's blood program. Sponsored by E. R. Squibb and Sons, Division of the Olin-Mathieson Chemical Corporation, the film was presented by John C. Leppart, Executive Vice President of the Olin-Mathieson Corporation. Dr. David N. W. Grant, director of the Red Cross Blood Program, was chairman of the ceremonies, and Ellsworth Bunker, American Red Cross President, expressed the appreciation of the organization in his acceptance remarks. Attending the preview were physicians, government officials, personnel from the Red Cross and from the Hartford, Conn. Hospital, where hospital scenes were filmed. Aimed especially at groups that make up the bulk of regular blood donors, the film answers questions frequently asked about what happens to blood after it is donated through the Red Cross blood centers.

Air Force General Sets Meeting Date

General Otis O. Benson Jr., USAF Medical Service, and currently head of the Aero Medical Association, announced that the organization would hold its 26th annual meeting at the Hotel Statler, Washington, D. C., March 20-23, 1955. Medical people from many countries throughout the world are expected to attend and participate in the

presentation of scientific reports on aviation medicine. In addition to the scientific program a variety of activities has been planned.

Fellowships and Travelships

The National Foundation for Infantile Paralysis announces the availability of a limited number of fellowships in the field of physical therapy teaching. These fellowships, which may be approved for one to three years, are made available to help prepare properly qualified candidates as instructors and administrators in physical therapy schools.

Applicants for fellowships must be U. S. Citizens (or applicants for citizenship) and must be in sound health. Eligibility requirements also include: a baccalaureate degree; membership in the American Physical Therapy Association and/or registration by the American Registry of Physical Therapists; and significant satisfactory general experience as a physical therapist, preferably for three years or more. The experience requirement may be reduced for well-qualified candidates who are nominated by the physical therapy school for a program of at least two years of study.

Each candidate must propose a program which will include basic academic and clinical study, specialized training in one or more fields of physical therapy, and supervised experience in teaching.

Selection of candidates is made on a competitive basis by the National Foundation's Clinical Fellowship Committee.

Also available is a limited number of travelships for physical therapists who wish to observe and study examples of administrative, teaching or clinical service in physical therapy in the United States or abroad.

The purpose of this program is to provide an opportunity for experienced physical therapists to further their knowledge of the developments in the field of physical therapy by personal observation and to permit an exchange of ideas among physical therapists.

Eligibility requirements include: graduation from an approved school of physical therapy; membership in the American Physical Therapy Association and/or registration by the American Registry of Physical Therapists; and a minimum of three years of experience as a physical therapist in a clinical, administrative or teaching position. Only U. S. citizens (or those who have applied for citizenship) in sound health are eligible.

The applicant must propose a program of travel appropriate to his individual situation and will be asked to estimate his financial need for maintenance and transportation. In no case will an award exceed \$2,500. The candidate must make his own arrangements with the institutions he plans to visit.

The Clinical Fellowship Committee of the National Foundation reviews each candidate's qualifications as well as his proposed program individually, and selection of candidates is made on a competitive basis by the Committee.

For further information and application forms address: The National Foundation for Infantile Paralysis, Division of Professional Education, 120 Broadway, New York 5, N.Y.

Newly Registered Therapists November 17, 1954

Beckwith, Joan May, School of Physical Therapy, Medical College of Virginia, Richmond, Va.

Bennett, Joan Marie, 298 Andrew St., Sharon, Pa.

Bobb, Bruce Timothy, Box 343, Medical College of Virginia, Richmond, Va.

Campbell, Peggy Ann, 3459 Riverview Dr., Weirton, West Va.

Cossoy, Barbara Ann, 109 S. Iowa Ave., Atlantic City, N. J.

Cromwell, Russell Raymond, School of Physical Therapy, Medical College of Virginia, Richmond, Va.

Cusson, John Joseph, 47 Park Terrace Rd., Worcester, Mass.

Davis, Frances Ward, Pawley's Island, S.C.

Earley, Barbara Lee, 107 W. Duval St., Richmond, Va.

Ellington, George Rucker, Jr., 909 Floyd Ave., Richmond, Va.

Engel, Julius A., 2019 Libby Dr., Houston, Tex.

Fleer, Paul Frederick, 33 Ferndale Rd., North Caldwell, N.J.

Franklin, Loring L., School of Physical Therapy, Medical College of Virginia, Richmond, Va.

Gregory, Jean Harrison, Halifax, N.C.

Harper, Edwin Rhue, 605 Landing St., Norfolk, Va.

Hartman, Charles William, 1902 N. Broad St., Galesburg, Ill.

Hunter, James Warren, Jr., 1101 Grove Ave., Richmond, Va.

Jennings, Gwendolyn Anne, Waverly, Va.

Judge, Marion, Rt. 1, Box 38J, Orlando, Fla.

Kennedy, Betty Jo, Box 22, Pound, Va.

Latto, Toulia, 59 Elizabeth Lane, Moreland, Charleston, S. C.

Little, Barbara Ann, School of Physical Therapy, Medical College of Virginia, Richmond, Va.

Lonker, Lenore, 343 Penn St., Reading, Pa.

Mayes, Ernest Henry, 6243 Evans Ave., Chicago.

McDonald, Ruth Ann, 33 Oakland St., East Braintree, Mass.

Mosman, LeRoy Earl, PO Box 311, Boise, Idaho.

Murray, William Earl Jr., 1708 Texas Ave., Richmond, Va.

Noble, Joyce Lorraine, School of Physical Therapy, Medical College of Virginia, Richmond, Va.

Parrish, Doris Jean, Rt. 2, Bryson City, N. C.

Popielek, Celia, 65 Mountain Ave., New London, Conn.

Pressley, Pershing Thomas, Rt. 2, Box 356, Anchorage, Ky.

Presty, Frank, 201 Smith St., East Stroudsburg, Pa.

Shell, Dominic D., St. Joseph Riverside Hospital, Dept. of Physical Medicine, Warren, Ohio

Tignor, Jessica Elizabeth, Callas, Va.

White, Sibyl Jeannette, Rt. 2, Statesville, N. C.

Zajac, Joseph, 916 N. James, Hazledon, Pa.

November 22, 1954

Allen, Dorothy Bennett, 830 Maple St., Columbia, S. C.

Barnhouse, John Douglas, 899 National Rd., Bridgeport, Ohio

Beachler, Marylois, Fredonia Rd., Greenville, Pa.

Covington, Harry T., 705 W. 16th St., San Angelo, Tex.

Dixon, Ruth A., 233 Verna Dr., Pittsburgh.

Ducharme, Barbara Jane, Officers Mail Section, Fitzsimmons Army Hospital, Denver.

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PHYSICAL MEDICINE ABSTRACTS

Electromyography of Muscles of Posture: Thigh Muscles in Males. J. Joseph, and A. Nightingale. *J. Physiol.* 126:81 (Oct.) 1954.

Previous workers have investigated the activity of thigh muscles in maintaining the upright position in humans, but there are some criticisms of these observations.

This article describes the method and results of electromyography of muscles of posture namely, the thigh muscles in males. Fourteen males, 19-24 years of age, were investigated and three standard postures were used — 1) standing at ease; 2) standing with weight mainly on right limb, and 3) standing with weight mainly on the left limb. In some subjects additional investigations were made in order to study the effects of shifting the line of weight in relation to the knee joints. These subjects were asked to raise their arms forwards at the shoulders, and to sway at the ankle joints from the stand at ease forwards, backwards and forwards again to the original position. The quadriceps muscle was investigated by attaching one electrode to the vastus lateralis and one to the vastus medialis. The hamstring muscles were investigated by attaching one electrode to the lateral hamstring and one to the medial hamstring.

Results led to the following conclusions— 1) in standing at ease or in a limb which is mainly bearing the weight of the body, the thigh muscles both front and back, do not produce detectable potentials; in these postures some of the ligaments of the knee joint support the body weight, and 2) shifting the line of the body weight forwards causes the hamstrings to contract in order to prevent flexion at the hip joints and shifting it backwards causes the quadriceps to contract to prevent flexion at the knees.

Techniques in the Vocational Rehabilitation of Chronically Unemployed Psychiatric Patients. I. Stevenson, and T. Fisher. *Am. J. Psychiat.* 3:289 (Oct.) 1954.

Recent advances in psychiatric therapy have increased the number of potentially employable patients. Many convalescing patients need vocational rehabilitation to com-

plete and fortify their recoveries. Although outnumbering all other types, psychiatric patients constitute fewer than ten per cent of the clients of state vocational rehabilitation departments.

Continued idleness and unemployment frequently delay final recovery. These circumstances bring a loss of self-esteem. Such a loss of self-esteem causes the patient to cling to his residual symptoms. The continuing symptoms block employment and consequently prolong the lowered self-esteem in a vicious circle.

This report is the result of a direct approach of this unemployment problem of psychiatric patients through the use of vocational rehabilitation. Twenty-five chronically unemployed psychiatric patients were used as subjects. The approach consisted of a collaborative effort between a psychiatrist and a social worker. Significant techniques and factors in successful cases were preliminary clarification of the patient's physical condition with appropriate treatment or reassurance and explanations; adequate working through of the primary psychological problems; deliberate focussing of discussions on the topic of employment; generous support and reassurance from the social worker during the period of return to work; increase of economic pressure by planned termination of public assistance; attention to selection of jobs suitable to the patients' psychological needs, and continuous therapist-patient relationship after return to work.

Of the twenty-five patients, twenty returned to work and have been steadily employed for six months or longer. All patients who returned to work showed further improvement or complete disappearance of symptoms. The final therapeutic results seem to be greater than when a like amount of time is spent upon more traditional psychotherapy which is not especially focussed on the employment problem.

Raynaud's Phenomenon in Workers with Vibratory Tools. R. P. Jepson. *Brit. J. Indust. Med.* 11:180 (July) 1954.

Thirty-four males whose ages ranged from 26-57 years, and who represented eight in-

dustries utilizing vibratory tools, were carefully studied. Using reactive hyperemia testing, precipitation of Raynaud's Phenomenon by hand cooling, and a heat-flow test, along with X-Ray and blood studies, the exclusion of gross organic occlusion of the digital arteries was accomplished.

The physical conditions which precipitate the change of behavior in the digital arteries consisted principally of vibrations of 40-125 cps, as well as other variables, such as amplitude and wave form of fundamental and secondary harmonics, strength of grip required, type of material on which the work is performed, operator's skill and individual's susceptibility to the condition.

Onset of Raynaud's Phenomenon followed a symptomless period of work with the vibratory tool from one month to twenty years. The condition is more severe in the fingers to which most of the vibration is transmitted. There is little evidence to suggest that the phenomenon, once established, will disappear or appreciably abate in severity with discontinuance of the causative factor.

The Results of Non-Operative Treatment of Ruptured Lumbar Discs. Z. B. Friedenberg, and Robert C. Shoemaker. Am. J. Surg. 88:933 (Dec.) 1954.

Although the authors admit that morphologic alterations in disc structure can in themselves cause symptoms independent of any retropulsion of the nucleus pulposus, their discussion is restricted to 36 patients, 25 male and 11 female, who had myelographically positive demonstrable displacement. These patients were hospitalized for severe back and nerve root pain, and were treated by bedrest for one to three weeks. They were discharged each wearing a back support. Physical therapy was seldom employed. All were instructed to limit their activities.

Results were encouraging; 47 per cent were pain free after 4 years; 31 per cent had mild residual pain after 5 years, and 22 per cent had severe residual pain 5 years following hospital discharge. These findings compare favorably with the results from disc surgery, i.e., 60 per cent pain free; 40 per cent some residual pain, and 10 per cent unimproved.

A study of the capacity for work disclosed 6 of 11 laborers (55 per cent) in the series were able to return to work, and 94 per cent of those engaged in non-laboring pursuits returned to their former employment.

Mention is made of the fact that all discs, especially the lumbar ones, undergo physiological aging suggested by a loss of fluid content and mucoid material. The importance for advanced knowledge in this sphere is suggested.

Functional Brace for the Paralyzed Hand. Herbert Kent. J. Bone & Joint Surg. 36A:1082 (Oct.) 1954.

Amputees can now secure some excellent limb substitutes. On the other hand, patients with hemiplegia and monoplegia must accept a useless limb as a permanent handicap.

This article describes the preliminary report of the efforts to develop a functional brace which would permit some measure of independence for such patients.

The parts of the brace consist of a harness—a figure eight suspension strap with associated controls to actuate the arm, forearm and hook portions of the prosthesis; the controlling mechanism—consisting of a steel cable and mountings to actuate the hook, and the arm—a single two-inch leather cuff with buckle attachment which is used to anchor and fix the upper end of the brace. The elbow joint consists of a through pin joint with a manually controlled ratchet type of lock. The latter permits two locking positions between full flexion and complete extension. Two cuffs with buckle attachments are utilized in the forearm portion to provide a stable support. The approved terminal device or hook, developed by the Army Prosthetic Research Laboratory is used. The enclosed mechanism permits automatic locking or free movement of the hook arms.

Application of the brace is quite obvious. The only adjustments are those of the suspension harness and the curved guard in the hand which is used to prevent the flexed fingers from interfering with the operation of the limb.

The operation of the brace is by humeral thrust and similar to the operation of a prosthesis for an upper extremity amputee.

The advantages of such a brace are significant in that vocational rehabilitation is made feasible; self-care activities are permitted; bi-manual activities are permitted; psychologically the patient's emotional recovery is assisted, and the proprioceptive and kinesthetic senses which may be present are used daily.

Maternal Osteogenesis Imperfecta. Pelham P. Staples, and Humbert L. Riva. Obst. & Gynec. Surv. 4:557 (Nov.) 1954.

Maternal Osteogenesis Imperfecta is rare, occurring once in twenty-five to thirty thousand deliveries. It is transmitted by a Mendelian dominant trait and may be of the Prenatal Type-Osteogenesis Imperfecta Congenita—the infant is usually stillborn; Infantile Type-Osteogenesis Tarda Gravis—in whom fractures begin from the time of labor, birth or early infancy, or, Adult Type-Osteogenesis Imperfecta Tarda Levi—with proneness to fractures appearing at the age of two or three and continuing to puberty or

the early twenties. Fracture of the pelvis can occur in vaginal delivery thereby constituting a medicolegal problem.

Typically there is a history of fracturing the long bones out of proportion to trauma, blue scleras fading with age, asthenic build, poorly developed musculature, thin delicate skin, triangular facies, hypermobility of the joints and deafness due to otosclerosis.

The authors describe two patients who are sisters. One developed incomplete fracture of both rami of the right pubis, while the other was delivered without incident. Each had a short, normal delivery.

Moulding Polythene Plastic Splints Direct to Patient. J. B. Brennan. Lancet 2:948 (Nov.) 1954.

Described in a simple, but detailed manner is the manufacture of lightweight, durable plastic splints and braces using polythene for rigidity and polyurethane for padding.

The polythene is malleable at 120 C. and can be moulded to any bodily contour. It is extremely light and durable and can withstand abuse. It is physiologically inert and non-inflammable. Polyurethane is also non-inflammable, elastic and extremely light. It possesses a mould-ability far superior to "Sorbo" rubber.

The construction of a kiln from a discarded physical therapy heating cradle as well as the entire technic from rough cutting to finished buffing is carefully and clearly presented.

Recent Advances in the Technique of Progressive Resistance Exercise. I. J. MacQueen. Brit. M. J. 2:1193 (Nov. 20) 1954.

The author advances the opinion that the amount of weight load used clinically for resistive exercises is often inadequate. He believes that the maximum weight that a muscle can lift should be employed in 2-3 sets of 10 RM and not in a progressive fashion as outlined by DeLorme and Watkins.

Distinction is made between a hypertrophy or "bulk" program and a "power" program, and the paper deals at length with refinements of the technic in the hypertrophy and power programs.

All data in this paper were based on a questionnaire sent by the author to seventeen area finalists of the 1953 "Mr. Britain" physique contest. An attempt to make inferences between their replies and the treatment of pathology is weak and not convincing.

The Effects of Resistance Exercises on the Nitrogen, Phosphorus and Calcium Metabolism of Patients with Rheumatoid Arthritis. A. S. Clark, et al. J. Clin. Invest. 33:505 (April) 1954.

Physical activity has been reported to have a proteinanabolic effect and cause calcium

retention in normal subjects. The metabolic responses to exhaustive physical exertion during active rheumatoid arthritis have never been investigated. The purpose of these studies was to determine the effects of heavy resistance exercises on nitrogen, phosphorus and calcium metabolism in patients experiencing exacerbations of this disease.

The subjects studied were two male patients, 42 and 47 years old respectively, each with long histories of generalized rheumatoid arthritis and, at the time, manifesting acute symptoms of the disease. M. M., age 42, was under observation for fourteen three-day periods and following a nine-day interval was observed again for nine six-day periods for a total of ninety-six days. During the fifth through the ninth three-day periods, he received testosterone and during the third through the sixth six-day periods, he received heavy resistance exercise. J. W., age 47, was observed for eight three-day periods for a total of twenty-four days. He received no testosterone but during the fifth through the eighth three-day periods, he also received heavy resistance exercise.

Three balance studies were performed. Stools were collected in six-day periods and urines in three- and six-day periods. Diets, urines and stools were analyzed for nitrogen, phosphorus and calcium. Urines were analyzed for 17-ketosteroids in the second patient, J. W. All previous medications and physical therapy were omitted. Complete bed rest was instituted one week before the control periods were begun except in the testosterone experiment, during which time M. M. was given lavatory privileges.

The testosterone propionate was administered intramuscularly in oil in doses of 25 mg./day. The exercises, consisting of combined hip and knee extension and trunk flexion, were administered on equipment described by Doctors De Lorme and Watkins which allowed exact repetition of the positioning of the patient and measurement of the amount of work done. Exercise loads were determined in accordance with the progressive resistance exercise technic. Each patient was given two exercise periods daily. M. M. performed a daily work load of 21,000 foot pounds, whereas J. W. performed a daily work load of 15,900 foot pounds.

The investigation provided the following results: Both patients experienced an improved sense of well-being and increased tolerance. Articular symptoms or swelling did not increase in either patient during the exercise periods. There were no changes in the manifestations of arthritis in M. M. during the administration of testosterone. Nitrogen retention occurred during the exercise periods in both patients. Phosphorus was retained by both patients during exercise and also by M. M. during the administration of

testosterone. Both exercise and testosterone decreased urinary calcium in M. M., but exercise had no effect on urinary calcium in J. W. The excretion of 17-ketosteroids did not change during exercise in J. W.

In the evidence presented, resistance exercises resulted in a proteinanabolic effect in two patients with active rheumatoid arthritis and a decreased excretion of calcium in one. The same effects were observed in one of the subjects during the periods he received testosterone. However, resistance exercise did not alter the excretion of 17-ketosteroids in the one patient on whom such determinations were made.

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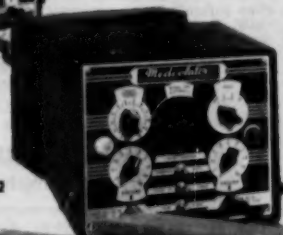
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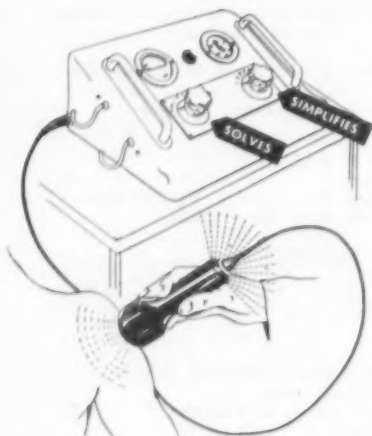
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1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.

2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 1, 1955.

3. Contributions will be accepted from medical students, internes, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.

4. The essay must not have been published previously.

5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.

6. Manuscripts must not exceed 3000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.

7. The winner shall receive a cash award of \$200, a gold medal properly engraved, a certificate of award and an invitation to present the contribution at the 33rd Annual Session of the American Congress of Physical Medicine and Rehabilitation at the Hotel Statler, Detroit, August 28-September 2, 1955.

8. The winner shall be determined by the Prize Lecture Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.

9. All manuscripts will be returned as soon as possible after the name of the winner is announced.

10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Prize Lecture Committee, no contribution is acceptable. The Congress may also award certificates of merit to contributors whose essays may be considered second and third best submitted. Announcement of the winner will be made after the annual meeting.

#1000.00 Cash Award

The Birtcher Corporation will award the sum of \$1000, on or before February 1, 1956, to any physician presenting what a disinterested committee shall select as the best paper or book on the subject of "ULTRASONICS IN MEDICINE" during the year 1955. Physician-authors throughout the United States and Canada are eligible.

Papers:—Papers published in any professional medical journal are automatically considered as eligible.

(The Birtcher Corporation will endeavor to scan all medical publications and draw the attention of the selecting committee to each published paper, however, authors are requested to draw the attention of The Birtcher Corporation to any publication.)

Non-Published Papers:—A physician who has presented a paper on Ultrasonics to an organized medical group, but whose paper is not published in a medical journal, may submit a typewritten copy direct to The Birtcher Corporation giving presentation date and name of organized group to whom paper was presented.

Books:—Any book published covering the history, usage, medical philosophy, clinical reports, etc., of Ultrasonics in medicine will be considered as eligible.

Subject Matter of Papers:—A paper may report the use of Ultrasonic energy in clinical application in one case or an entire series, or may report laboratory investigations, or work on animals, which is significant in relation to Ultrasonics in the treatment of diseases in the human.

Selecting Committee:—All such material will be judged by a panel of three physicians, including a physiatrist and general practitioner. Material will be judged solely on the basis of its overall contribution to the medical profession in the use of Ultrasonics in medicine, not literary style. No staff member of The Birtcher Corporation or shareholder of said Corporation will serve on the judging committee, nor have his/her paper participate. The judgment of the committee will be final.

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